The Builder.

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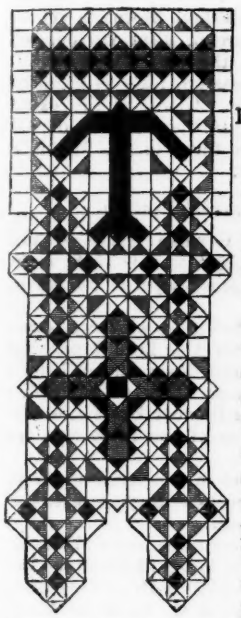

Architecture and Legislation.

THE juxtaposition on our table of several forms of Building Act, proposed or in force, suggests some observation as to the manner and degree in which legislation of this nature affects architecture as an art, and whether prejudicially or otherwise. In the main, of course, such Acts have a practical object only, that of insuring sanitary and constructive safety and completeness in the street buildings of large towns, and are for the most part negative rather than positive in their provisions, and scarcely affect general architectural construction, as they are only designed to insure a certain minimum of provision for stability, quite below what in most cases would be deemed a necessary foundation for anything like an effective architectural design. Where the provisions of the Building Acts infringe at all upon the province of the architectural designer, it is commonly in the "preventive service,"—in forbidding as contraband nearly everything which goes to make a building picturesque and effective. What would have become of those picturesque bits of old street architecture in some of our own as well as in Continental towns, which painter and architect alike delight to sketch, had those who were to erect them been clogged by such a sentence as this, enforced by official warrant:—

"No projection shall be built or made from or before any building in any street within 10 ft. above the level of the foot-pavement of such street, so as to extend beyond the general line of the walls of the building, except architectural decorations attached to, or forming part of, an external wall, and projecting *not more than* 3 in. therefrom; and no cornice, coping, or balcony above the level of 10 ft. from the foot-pavement of such street, shall project more than 18 in. in streets not exceeding 30 ft. wide, and no other architectural decoration above the level of 10 ft. above the street shall project more than 6 in.," &c.

This is from Section XXIV. of a proposed new Building Act for Liverpool, originally intended to have been brought before Parliament this session, but which is at present in abeyance. We do not say at once that some such clause may not be absolutely necessary in relation to buildings which are to flank crowded thoroughfares, and where provision must be made to obviate unnecessary drip in wet weather, as well as possible danger from imperfectly-constructed overhanging features. But under such regulations, what would become either of such buildings as those in the Florentine palatial style, with its grand projecting cornice, or of the aforesaid picturesque oriels and corbelled upper stories of Mediæval Germany? It should seem, according to this, that we must choose between safety and commodiousness on the one hand, and architectural effect on the other hand, as regards street architecture. Must we really accept this fate? Is there no safe steerage between Scylla and Charybdis, no compromise possible between the requirements of the architect and of borough officials? At all events, this species of restriction has been of pretty long date in Liverpool, for we find, under the Section LXVII. of the existing Building Act for that borough a similar provision in even more stringent terms:—

"And be it enacted that no projection of any kind shall be made in front of any building over or upon the pavement of any street, *except for shop fronts* or for doorways, and no part of such shop front or doorway in streets under 10 yards wide . . . . shall project more than 6 inches, except the cornice, which may project 18 inches, &c. Provided always, that it shall be lawful for any person, with the consent in writing of the Council, testified by a copy of some resolution in writing of the Council, certified under the hand of the Town Clerk, and also with the consent of the Commissioners for the better paving and sewerage of the town of Liverpool, testified by a copy, &c. (as before)—to build with or add to, or cause to be built with or added to, any building fronting any street, any projecting pilaster which shall not project more than 6 inches, or, in streets more than 10 yards wide, more than 12 inches from the perpendicular line of the front brick or stone work of the building where it fronts such street."

This solemn and elaborate preparation for the legalising of the regulation shop-front pilasters, the most thorough specimen of bastard architecture in existence, is amusing enough in its way, but it is difficult to know why the framers of Building Acts should show such a special delicacy of feeling with regard to shop-fronts. The fact is that the prevailing style of shop-front architecture is the curse of our towns, architecturally; and so far from seeing clauses made specially to facilitate this sort of production, we would rather see it negatived by some deftly-framed prohibitory clause, that no one shall dress up his shop front in wooden pilasters and sham architraves, but erect it in an honest and solid manner on sufficient brick or stone piers, &c. The proposed Metropolitan Building Act does offer some slight check upon over-much of cradling and bracketing architecture, in the provision (clause 69), that,—

"No part of the woodwork of a shop-front shall be fixed higher than *eighteen feet* above the level of the nearest public way, or nearer than *four inches and a half* to the line of junction of any adjoining building; and a pier or corbel of brick, or other fire-resisting material, at least *four inches and a half* thick, shall be built or fixed next to such adjoining building, as high as any such woodwork is fixed, and projecting, at least, to the extent of such woodwork."

This is a provision in favour of actual, though not of apparent, solidity of construction; but it is to be regretted that a Bill, formed partly under architectural direction, should, while putting a veto (by the clause demanding that all walls be "of brick or stone") upon any kind of genuine timber construction even for shop-fronts, make special encouragement or provision for a conventional screen of wood used in a non-constructive manner. In this point, the old and proposed Liverpool Building Acts also coincide; and we fully concur, as our readers are aware, in the prohibition or discouragement of timber construction in large towns; but it is a pity to see a false use of woodwork encouraged, at the expense of a genuine and true use thereof. The proposed new Liverpool Building Act, it may be observed, ignores wooden bressummers altogether, decreeing iron in all cases; a decree scarcely necessary, since a good wooden beam may be as durable as an iron one; certainly, there are wooden bressummers in existence and in good bearing condition, which have stood a longer test of time than we have been able to put iron beams to as yet.

In the matter of roofing, it is worth notice that none of the Acts before us recognise, or at all events encourage in their wording, the portentously high Mansard roofs, which are at present such a feature in all exhibitions of architectural drawings. The existing Liverpool Act, in scheduling thicknesses of walls and other matters with reference to height, makes no account of stories in the roof; and the proposed Metropolitan Act specially provides that "in a building used wholly or in part as a dwelling-house, there shall not be more than one story of rooms constructed wholly or partly in the roof, except with the permission of the Board;" and further that "in a building used wholly or in part as a warehouse, or for purposes of business, and not used in any part as a dwelling-house, there shall not be any story of rooms constructed wholly in the roof." Such a regulation would probably be equally desirable on constructive and architectural grounds; but some of our warehouse and hotel designers will be shorn of the strength residing, not "in their hair," but in their roofs, by this Delilah of legislation. As to the constructive material of decorative adjuncts, the Metropolitan Bill provides, in general terms, like the existing Act, that "any cornice, coping, facing, window-dressing, portico, porch, balcony, verandah, and balustrade, and every projection or architectural decoration whatever, and also the cornices of any overhanging roof shall, except with the approval of the Board, be of stone brick, tile, artificial stone, vitrified stoneware, slate, cement, or other fire-resisting material." This, of course, precludes wooden ornament, and may deliver us from we know not what possible fantastic tricks of barge-boards and finials; but then we have a parenthetical clause excepting from this dictum not only dwelling-houses "distant at least 15 ft. from any other building," but also "cornices and dressings of window fronts of shops;" and why, we again ask, this exceptional permission to shops to adorn themselves with combustible adjuncts not permitted, in the same situation, to any other class of building? Is it impossible for tradesmen to sell goods without hanging a wooden cornice over their inevitable sheet of plate-glass? It is satisfactory to find there is a limit beyond which masonry piers must be introduced. "When a building, enclosed with walls, is constructed so as to leave on the ground story, or on that story and another story or stories, an extent of opening greater than *one-half* of the whole area of the vertical face, or elevation of the wall or story or stories in which such opening is left, there shall be sufficient piers of brickwork or other fire-resisting material so disposed as to carry the superstructure." This would put an end to the erection of some marvellous webs of iron and glass which in the streets of certain towns we have seen towering from pavement to cornice; but we cannot help thinking such stipulations might be carried further, and shop-fronts be compelled to rest in all cases on adequate brick or stone piers. As to the gain in architectural appearance we need say nothing; possibly such a regulation might be accompanied in time by the further advantage of checking the system of competition in mere showiness and ostentation of goods between tradesmen, and suggest a habit of depending for success more on actual excellence and less on show. If the present aspect of shop architecture reflects (as we think it does only too truly) the falsity and flimsiness of much of our trade materials and trade principles, is it impossible that there should be a converse action, and that a better style of shop architecture, thrust upon them whether they will or no, should exercise a beneficial effect upon the tradesmen of England?

The proposed Act for Liverpool deals a blow at stone lintel construction in the provision that "every opening above 2 ft. 6 in. in width which is not arched over throughout the thickness of the wall, or which has not an iron lintel, shall have a discharging arch of brick or stone." The rule does not define whether a window with a stone head and one or more stone mullions is to be classed as one opening without regard to the mullions, or not. It may be pointed out that in certain positions (*i.e.*, near the angle of a building) the "relieving arch" might have a tendency to disturb rather than assist the stability of the structure, by bearing horizontally on the angle pier. When we come to the roofs of our buildings, we find Building Act directions in general a good deal at variance with architecture. The present Liverpool Act, after some definitions and restrictions as to party walls, provides always "that nothing in this Act shall prevent any person from carrying up any wall above the

slates of the roof to form a parapet," &c. Not unfrequently it has been found that when a parapet wall has been built over the cornice line, there has been "nothing to prevent" it coming down into the street at very short notice; but the Metropolitan Act is to provide that every building adjoining a street *shall* have a parapet at least 1 ft. above the gutter. Why the parapet wall, which practically affords the opportunity for distributing an overflow of rain-water *within* the building instead of outside it, and which architecturally gives the roof the appearance of sinking into the building instead of covering it, should be a feature so favoured by the framers of Building Acts we do not very well understand. The suggested development of party walls generally above the roof is, indeed, rather alarming to contemplate, and sometimes not a little puzzling. Thus the new Liverpool Act directs not only that "every party wall shall be carried up above the roof, flat, or gutter of the highest building adjoining thereto, and also above any part of such roof as shall be within the distance of 3 feet opposite thereto;" but also that "every party wall shall be carried up above any turret, dormer, lantern, or other erection of combustible material on the roof or flat of any building within 4 feet of such party wall," &c. The general impression conveyed by this, after two or three perusals, is, that something on every roof shall be higher than something else on another roof; at all events, the system of "slighting or overcrowing" (as Dugald Dalgetty would say) all erections on your neighbour's roof by a brick wall on your own, would be difficult to carry out in some cases, and leads to some painful considerations as to possible appearances resulting from the rigid enforcement of the principle. The Metropolitan Act gives the same directions in rather more perspicuous wording. We question whether the evident object, the prevention of the spread of fire, would really be attained in any marked degree by these provisions; and the amount of otherwise useless brickwork with which our roofs must be cumbered in accordance with such directions is a matter not to be (and which, indeed, in a literal sense, we fear *cannot* be) left entirely out of sight.

So far as the examples of architectural legislation before us are to be taken as specimens, it would appear that the tendency of such legislation is to steer clear of any precise reference to architectural features, except with regard to those which, whether rightly or wrongly, are most universally employed, and to make exceptions in favour of these only, placing all others under rigid restrictions. The result is to make the Building Act, in the main, an engine for the favouring and evoking of architectural commonplace, and throwing obstacles in the way of architectural invention. And, of course, it is impossible to legislate definitely, except upon practical matters. But it seems a pity that the framers of such Acts should not have more before their minds the interests of architecture, and provide for judicious deviation from the rules so rigidly laid down by more general provisions.

OLD STAINED GLASS IN ENGLISH CHURCHES.*

Glass of the Fifteenth Century.

THE existing remains of English glass of the fifteenth century appear to be about as numerous as are the examples of the previous period.

Cambridge possesses some glass of this date, in the chantry of Provost Braesie, removed in 1857 from one of the vestries, and restored by Mr. Constable, representing prophets and apostles.

Canterbury Cathedral, in the north transept, has a painted window, the gift of Edward IV. and his Queen; their own figures, those of their two sons (the princes murdered in the Tower), and those of their daughters, still remaining in it.

In the Church of *Dorchester* (Oxon) is a window of four lights, representing the Stem of Jesse, which affords a unique example of the combination of stonework and stained glass in one mystic design.

In *Durham* Cathedral, the west window represents the tree of Jesse. The window of the south transept illustrates the *Te Deum*. The date is 1450.

The windows of the north aisle of the Church of *Eaton-Socon*, Bedfordshire, represent the legends of St. Nicholas and St. Ethelthreda. The costumes are of the period of Edward IV.

The stained glass in the east window of the Chapel of St. Gabriel, in *Exeter* Cathedral, dates in the first half of the fifteenth century.

The series of five windows representing Scriptural subjects, apostles, prophets, Roman emperors, &c., of *Fairford* Parish Church (Gloucestershire), were taken in the year 1492 on board a Flemish vessel. Some have attributed the workmanship to Albert Dürer. Copies of these windows are now in course of completion for the South Kensington Museum.

The painted windows of the Church of *Gatton*, Surrey, filled with sacred subjects, were removed from the Cathedral of Aerschot, near Louvain. They are Flemish fifteenth-century work.

In the Lady Chapel of *Gloucester* Cathedral the headings of the window lights retain their original glass. The east window is also filled with fifteenth-century glass, white and yellow being much employed.

At *Levrington*, Cambridgeshire, the early Perpendicular east window contains a tree of Jesse. The east window of the north aisle represents, in the five larger lights, ten Jewish kings, each attended by a prophet or a saint, with a motto on a scroll. In the smaller compartments are figures of the Virgin Mary, the Evangelists, and other personages, interlaced by a pattern of vine branches. On the south side of the chancel is our Lady of Pity, with a knight and a lady kneeling on either side.

The remains of glass in the north and south choir aisles of *Lincoln* Cathedral are of a Perpendicular character.

In the Wenlock Chapel, in the *Luton* Church, the upper compartments of the windows are painted with small figures of saints and angels, on a ground of plain glass, charged with various small devices, the arms of John, Lord Wenlock, the founder, within the garter, and several other escutcheons, being scattered about beneath the figures.

The patterned glass windows of the Bede House Hall, at *Lyddington*, Rutlandshire, are of the latter part of the fifteenth century.

The west window of the south side of the choir of the Priory Church of *Great Malvern* was presented by Richard III. It contains twelve full-sized figures. Six windows on either side of the choir, and the east window of the church, contain much stained glass of the same date. There are illustrations of the Life of Christ, the Last Supper, and heads of saints, surrounded with glories, in the latter. The foundation of the priory, by Saint Werstan, King Edward the Confessor, Bishop Wolstan, and other bishops and priors, the marriage of Jehoiakim and Anna, the Crucifixion, and the Annunciation, are among the subjects illustrated in the side windows. In the Jesus Chapel the north window contains four gospel scenes, and the portraits of Arthur Prince of Wales, son of Henry VII., and of Sir Reginald Bray, privy councillor to that sovereign, which are the only perfect remains of a series described by Habington, *temp.* Charles I.

There is painted glass, in the Perpendicular style, in the church of *Mells*, Somersetshire; one window containing a figure of Mary Magdalene.

The glass in the windows of the chancel and nave of *Nettlestead* Church, Kent, is in good condition. The date is 1465.

The hall windows of *Ockwell's House*, Berkshire, are filled with heraldic glass of the middle of the fifteenth century.

In the series of illuminated windows in churches and chapels at *Oxford*, glass of the fifteenth century is to be found in the west window of Christchurch Cathedral, in the Church of St. Peter-in-the-East, in St. John's Chapel, Merton College, and in the hall, New College.

Windows of the fifteenth century exist in the Church of *St. Rew*, Cornwall.

The Church of St. Thomas, *Salisbury*, contains in the windows of the south aisles painted glass of the time of Henry VI. In the banqueting-hall of John Hall, in the same city, is glass of the same, or of the succeeding, reign.

In the south aisle of *Tickhill* Church, Cornwall, is a "Creed window," in which each of the apostles is represented, accompanied with the article in the apostles' creed traditionally ascribed to his authorship.

The glass in the east and side windows of the Beauchamp Chapel, *Warwick*, was executed by John Prudde of Westminster, A.D. 1447.

The arms of Bishop Babwith (three chaplets of holly) in the window of the chapel of the Vicar's Close, *Wells*, date 1407 A.D.

Winchester contains windows in the refectory of the hospital of St. Cross representing the arms of Cardinal Beaufort, of the latter half of the fifteenth century. Fragments of the time of Edward IV. and Henry VII. are in the library window of the college, in those of St. John's Church, and in the east window of the cathedral.

York is rich in stained glass of the fifteenth century. The west window of the cathedral is by John of Coventry, date about 1404. The east window of the choir is by the same artist, containing 115 Scriptural subjects, each about 2 ft. 2 in. high. In the window of the north choir aisle Archbishop Bowet is represented on his knees before an altar, surrounded by shields charged with the arms of his family. In the south transept eastern aisle is glass of the reign of Henry IV. Glass of the same century is to be found in the windows of All Saints' Church, and in those of St. Martin's Church in the same city.

Glass of the Sixteenth Century.

Some Flemish and German glass of the sixteenth century, A.D. 1537 to A.D 1543, is in the windows of the Mayor's Chapel of St. Mark, *Bristol*.

Twenty-six large stained-glass windows, forming a complete history of Our Lord, beginning from the birth of the Virgin Mary, are in King's College Chapel, *Cambridge*. The date is 1527–1531. In the chantry of Provost Brassie, in the same town, is some glass of the same age, restored by Mr. Constable.

Durham Cathedral has a marigold window, with fragments of sixteenth-century glass, in the Chapel of the Nine Altars.

Lichfield Cathedral contains some Flemish glass, from the Cistercian Abbey of Herckenrode, near Liége, dating 1530–1540 A.D. In the aisle of the south transept is to be seen Mary Magdalen at the foot of the Cross, together with the figures of benefactors to the Abbey. In the south choir aisles, we have the Holy Trinity in the centre, a knight supported by St. Hubert on one side, and a shield of arms on the other. In the Lady Chapel are five windows representing subjects from the New Testament, and two containing kneeling portraits of patrons and benefactors of Herckenrode.

The east window of St. Margaret's Church, *Westminster*, is said to be the finest specimen of stained glass in London. It is in the early cinque-cento style, and was executed for Henry VII. at Gouda.

A glass window of this period, from the Cathedral of Basle, is in the possession of Mr. William Smith, Upper Southwick-street, *London*.

Oxford contains glass of the sixteenth century in the Church of St. Peter-in-the-East, in the hall of New College, and in the Bodleian Library.

In the Church of *St. Neot's*, Cornwall, are six windows, containing Old Testament subjects, of the early part of the sixteenth century. There are also portraits of benefactors, patron saints, labels, the history of St. George, and the legend of St. Neot, each adorned with inscriptions.

The west window of *Salisbury* Cathedral contains the shield of arms of Bishop Jewell. Date, A.D. 1562.

Southwell Minster has the four lower east windows of the choir filled with French cinque-cento glass paintings, presented by Mr. Gally Knight in 1818, representing the Baptism of Christ, the Raising of Lazarus, the Triumphant Entry into Jerusalem, and the Mocking of Christ by the Jews.

In the west window of *Wells* Cathedral is cinque-cento glass, brought partly from Rouen, and partly from Cologne, by Dean Creyghton, illustrating the life of John the Baptist. The date, 1507, is traceable on one of the lights.

Winchester Cathedral has the east window filled with Perpendicular painted glass of a date a little earlier than 1525, the work of Bishop Fox, whose arms and motto, "*Est Deo Gratia*," are introduced. In point of execution it is said to be as nearly perfect as painted glass can be. In both aisles of the choir, and in the clear-story windows, as well as in the east window of the south transept, are also remains of cinque-cento glass.

There is glass in *York* Cathedral referred to the sixteenth century; but the description of its date and character is contradictory.

The famous windows which the Constable Anne de Montmorency commissioned Bernard Palissy to paint for the Château of *Ecouen*, representing the history of Psyche, have been removed to the residence of M. le Duc d'Aumale, at Twickenham.

* See p. 458, *ante*.

Glass of the Seventeenth Century.

The windows of the aisles of the choir in *Bristol* Cathedral are filled with enamelled glass of the seventeenth century. The subjects are, on the north side, Jonah escaping from the whale, the Ascension, the Agony in the Garden, the Ascension of Elijah, and the Sacrifice of Abraham; those on the south are the Expulsion of the Money-changers, Jacob's Dream, the Tribute Money, Melchisedec and Abraham, and Gideon and the Fleece. Much of the original glass has been replaced by "pot glass." The jumble of subjects is unprecedented.

The stained-glass windows of Archbishop Abbot's Hospital Chapel, *Guildford*, date in the seventeenth century.

The Flemish painted glass in Lincoln's-inn Chapel, *London*, is by Abraham Van Linge. Date, A.D. 1640.

The glass in the six-light window of the north transept of *Malvern* Priory Church, containing full-sized figures of St. Paul, St. John Evangelist, and St. John Baptist, and passages in the life of Christ, divided by labels, is German, of the seventeenth century.

The windows of the Church of St. Stephen, *Norwich*, date A.D. 1601. Those of the Church of St. Michael Coslany, in the same city, date in 1610.

In *Oxford*, the window of the south aisle, the north transept, and the transept aisle, of Christ Church Cathedral, were executed by Abraham Van Linge, A.D. 1630—1640. St. Peter's Deliverance from Prison, in the north aisle, is by Isaac Oliver, A.D. 1700. There is also glass by Van Linge in Balliol College Chapel, in Lincoln College Chapel, in Queen's College Chapel, in University College Chapel, as well as glass of the same date in the Chapel of Magdalene College.

Glass of the Eighteenth Century.

Bristol Cathedral exhibits in its west window inferior stained glass, dating 1710, A.D.

The blazonry in the upper part of the east window of *Exeter* Cathedral is dated A.D. 1766.

The great west window of the nave of *Lichfield* Cathedral is by Brookes, A.D. 1776.

In *London*, the Resurrection and the Last Supper, by Joshua Price, are represented in the Church of St. Andrew, Holborn, date A.D. 1718. There is some late Flemish glass in the Church of St. George, Hanover-square.

Oxford has glass painted by Joshua Price, *circa* A.D. 1702, in the chapels of Magdalene and of Merton Colleges; and eighteenth-century glass in the Church of St. Peter in the East, and New College Chapel.

The east window of *St. Asaph* Cathedral was glazed by Eggington after a picture by Albano. Date, A.D. 1780.

The Elevation of the Brazen Serpent, designed by Mortimer and executed by Pearson, the gift of the Earl of Radnor, fills the east window of the choir of *Salisbury* Cathedral. Date, A.D. 1781.

The west window of *Worcester* Cathedral dates A.D. 1792.

The rose-window in the north transept of *Westminster* Abbey was filled with stained glass in A.D. 1722. The great west window was executed in 1735. Neither of these windows is mentioned in the "Universal Art Inventory."

In the chapel of Heriot's Hospital, *Edinburgh;* in the cathedral churches of *Ely*, *Peterborough*, and *Ripon;* and in the churches of *Morley*, Derbyshire; *Rivenhall*, Essex; and *West Wickham*, are painted windows, cited in the Inventory, the dates of which are not stated.

We thought it due to our readers, as before hinted, to verify the references which are so freely made in Mr. Cole's Inventory, to the late Mr. C. Winston's valuable work on ancient glass. As far as the general index of this work is concerned, the churches named therein are all duly to be found in the Art Inventory. But in the woodcuts, the coloured plates, the preface, and the appendix, to this volume, occur the following additions to the information given in the Art Inventory. They will be found to be neither few nor unimportant.

Early English glass is figured from a lancet window in the Church of *Stockbury*, Kent, of the latter part of the thirteenth century.

A lancet window of pattern glass, in the Church of *Stanton Harcourt*, Oxfordshire, dates in the third quarter of this century.

Decorated glass, of the first quarter of the fourteenth century, is to be found in the cinquefoil tracery lights of two windows in *Newark* Church, Sussex.

The same date is attributed to a patterned panel and figure, in brown enamel, in *Snodland* Church, Kent. A St. Mathew in a tracery light dates some fifty years later.

In a tracery light at *Westonbirt*, is a shield, with the arms of Berkely, in brown enamel, dating soon after 1361.

At *Southfleet*, Kent, exists a patterned window of coloured glass, of the third quarter of the fourteenth century.

At *Worfield*, Kent, a head in brown enamel dates before the middle of the fourteenth century.

From *Urchfont*, Wilts, we have a patterned quarry, painted with a leaf in brown enamel, of the same date; and a *fleur de lys* from *Great Dunmow* Church, Essex, is an example of an heraldic bearing of the period.

Perpendicular glass of great beauty is figured by Mr. Winston from *Wanlip* Church, Leicestershire, containing a complicated emblem of the Trinity, and the arms of John of Gaunt and of Thomas of Woodstock, *cir.* 1393.

Woodmansterne Church, Surrey, has a *credo* figure, or apostle, in brown enamel, of the third quarter of the fourteenth century.

From *Much Hadham* Church, Herts, we have a circle containing the monogram I.H.S., surrounded with the motto, *hoc est nomen super omne nomen.*

Stoating Church contains two portraits of members of the Stotque family, of the early part of the reign of Edward IV. Two female heads, of the same date, in yellow and brown, are to be found in *Thaxted* Church, Essex; and tracery lights in the Church of *Temple Rothley*, Leicestershire, are of the same date.

At Reynold's-place, *Horton Kirby*, Kent, are the arms and crest of John Bowes, who died 1595 A.D. At *Franks*, Kent, are the Bathurst arms, dating 1591. From *Lambeth* Palace is figured a lily, in stained glass, forming part of a border round the arms of King Henry VII.

Mr. Winston further cites, as instances of false heraldry in glass, arising rather from the exigencies of the material than from the ignorance of the artist, the Royal arms of Edward II., in the Church of *Fawkham*, Kent; the arms of the family of Brockhall, *temp.* Edward III., in *Lukingstone* Church, Kent; those of Bowes, in *North Cray* Church, in the same county; and those of Philip II. of Spain, in *Wilton House*, Wilts.

Monumental inscriptions, in most instances accompanying portraits, in stained glass, are cited as existing in painted windows at St. Michael's Basishaw, Kediton, Chart Magna, Wellsborough, Tunbridge, Holywell Priory, Great Thorndon, Cotes Church, Danthorp, Barley, Great Malvern, Afford, and Wanlip. Thus the illustrations of Mr. Winston's book alone supply some thirty-five additions to the Art Inventory.

A still larger number of churches containing old stained glass is referred to, in topographical order, in Mr. Franks's "Book of Ornamental Glazing Quarries," published in 1849. This valuable monograph contains numerous drawings of panes or quarries of old stained, painted, or enamelled glass, each of which contains a perfect pattern, and not a mere portion of a general design. These are distributed as follows:—

Berkshire.—Cholsey, Moreton, Wantage.
Bucks.—Ickford, Kimble Power.
Cambridgeshire.—Bourne; King's, Queen's, and Emmanuel Colleges, Cambridge; Chesterton, Ely Cathedral, Fulbourne, Girton, Hardwick, Hildersham, Melbourne, Milton, Waterbeach, Wimpole.
Devon.—Exeter Cathedral.
Essex.—Bromley, Chignal, Swealy, Good Easter, Marks Tey, Pebmarsh, Takely, Thaxted.
Hants.—Winchester, St. Cross and St. John.
Hereford.—Mansley.
Herts.—Great Berkhampstead, Walton.
Kent.—Bethersden, Fawkham, Hardres (Upper), Kemsing, Penshurst, Southfleet, Westwell.
Lincolnshire.—Lincoln Minster.
Middlesex.—Greenford.
Norfolk.—Bexwell, Bressingham, Holm Hall, Southacre.
Oxfordshire.—Chakendon, Headington, Marston; Merton College, Oxford; Stanton Harcourt, Warborough, Wattington.
Somersetshire.—Taunton.
Suffolk.—Brandeston, Kenton, Gasley.
Surrey.—Challington, Newdigate, Ockham, Okewood Chapel.
Wales.—Penmachno, Carnarvonshire.
Wilts.—Sherington.
Worcestershire.—Birts Merton.

Thus the work of Mr. Franks cites sixty-six churches containing old stained glass, only two or three of which have been mentioned by Mr. Winton, or included in the Art Inventory. Descriptions of each of these windows are desirable, as Mr. Franks merely draws single panes. It is evident that the remarks which we made as to the large body of information which has to be added to that collected by Mr. Cole, are more than justified, a hundred distinct additions being thus collected from two well-known books alone. As illustrating the history of stained glass, the table we have formed possesses undeniable value. As an exhaustive list of the old stained-glass windows to be found in this country, the information thus arranged from the Art Inventory can only be regarded as rudimentary; but it is a rudiment from which may be hereafter developed a full topographical catalogue of English painted windows; and in that hope we commend it, not only to the perusal, but to the collaboration, of our readers.

It is remarkable that the valuable work of Mr. Franks, referring to so many churches not mentioned by Mr. Winston, appears not to have been consulted by Mr. Cole. It is not included in the "List of Works in Art Library containing Information upon Painted or Stained Glass," which is given in the "Universal Art Inventory," although it is entered in the "Universal Catalogue of Books of Art," with the added letters, "S. K.," denoting that a copy is to be found in the Art Library at South Kensington.

COMPLETION AND PRESERVATION OF ST. PAUL'S.

IT is not to the credit of England, in the matter of æsthetic education, that the metropolitan cathedral should have been allowed to remain unfinished for nearly two hundred years. Still less creditable is the fact that such a statement will be received, by nine persons out of ten, with surprise, if not with incredulity. That such is, however, the plain unvarnished truth, there is no doubt. Grand as is the outline, and careful or even elaborate the external finish, of the exterior of the finest modern Roman building, except one, in the world, the interior yet remains in the state, with few exceptions, at which it arrived when the builder proper had nearly completed his work, and the architectural decorator was about to begin his. Wind-tight and weather-tight, externally not only completed by the architect, but fringed with a stone balustrade, erected in addition to the design, and against the will, of Sir Christopher, the interior of St. Paul's is yet in the essentially temporary state of an unfinished building. The lovely carvings with which the unrivalled skill of Grinling Gibbons enriched the choir contrast with the unrelieved hue of the monotonous stone and plaster. Still more bald,—nay, positively offensive to the eye,—are the square, thickly-leaded panes of the mean glass windows, which, till very recently, have been the sole lights of the place. It is true that this defect is now, to some extent, in the course of rectification. We wish that we could speak with enthusiasm as to the success of the attempt.

An old engraving exists which shows the interior of St. Paul's richly decorated, according, as it is stated, to the design of Sir Christopher Wren. However that may be, there is no doubt that a certain and, indeed, a large amount of decoration is demanded by the very nature of the structure. We cannot compare St. Paul's, classic although we may term its Roman architecture, to those ancient hypæthral temples which owed their grandeur to severity of form and depth of unrelieved shadow. The *basilica*, not the colonnaded *cella*, is the primitive form of a Christian church. Vast, high springing arches, or lofty inclined roofs, have been always required to shelter the thronging worshippers of the northern climates. It has been the habit of the pious, certainly for fourteen centuries, to enrich the interior of churches of Romanesque and Roman design with colour and with gold; and that with a splendour proportionate to the structural importance of the work. In many cases the gleam of coloured marbles, the glitter of gilded bosses, and the rich warmth of painted medallions, burst on the eye of the visitor who enters the church, with a beauty for which the modest severity of the external architecture had not prepared the imagination. Who can forget the splendour of such interiors as that of the Church of the Annunziata at Genoa? The enrichment which in Gothic art is produced by the chisel of the sculptor, in moulding, and foliated capital, and delicately canopied

shrine, is supplied, in Roman structures, by marble, by gold, and by colour. The "dim religious light" of the painted window is essential to the character of each.

It need not be added that the movement on foot for completing the interior decoration of St. Paul's Cathedral is one to which we shall be most happy to contribute afresh all such support as lies in our power. We might have supposed, indeed, that it was only necessary for the great almsgiving public,—which has been stated to subscribe an annual sum so large that we hesitate to write it, to the various religious and benevolent objects of the metropolis,—to be made aware of the want, to find the means for supplying it, but for the failure which attended the first appeal. When, after so secular a slumber, the dignitaries of the Cathedral, and the worshipful authorities of the City, have awakened to the fact that, as regards this well-known Church, they are in fact "poor, and blind, and naked," we cannot believe that it will be long before they remove the stigma from the City.

We wish good speed to those who have taken in hand the completion and adornment of the Cathedral; and, referring to what we have previously said concerning the effect of the operations for the subterranean Metropolitan Railway, we appeal to them, in so doing, to keep—by day and night — a sure watch on the yet more important point of its permanent stability.

PHOTOGRAPHS ILLUSTRATIVE OF THE ARCHÆOLOGY OF ROME.

A SELECTION from the large number of photographs that have been made in Rome, under the direction of Mr. J. H. Parker, is now on view at the German Gallery, Bond-street, and catalogues of the whole are published. Mr. Parker has come to the conviction that the city of Rome was built upon the great earthworks of the primitive fortifications, which have governed the plan of the city, and have had great influence on the sites and plans of the principal buildings. These gigantic earthworks consisted, like other primitive fortifications of scarped cliffs, of terraces and trenches. They are very much obliterated by having been built over for many centuries, but the demolition of these buildings has brought the original work to light in many places, as on the Palatine, where parts of the wall of Romulus, of Etruscan character, and the foundations of his towers, are visible at the north end, opposite to the Capitol. These towers have evidently been left unfinished, and have been built over in the time of the Republic and of the Empire, and in the Middle Ages; but all these buildings being now destroyed, the foundations of the towers are visible, and photographs of them will be found in his series. The wall of Servius Tullius is visible in many places.

The great wall of Aurelian, thirteen miles long and 50 ft. high, with a corridor for the sentinels along the inside of it, is also copiously illustrated in another series of photographs. And the gateways which occur, many turned into fortresses by Honorius, A.D. 400, are also illustrated. The aqueducts for about a mile form part of the wall, and were incorporated in it by Aurelian, as were other buildings, such as the Prætorian Camp, the Sessorium with its amphitheatre, and the Lateran; the remains of the great wall are traced also in the Tiber, and in the Trastevere going up to the Janiculum. These form another series.

The aqueducts have been traced from their mouths to their sources, and there is in the room a remarkable plan of them from the sources to Rome. There are photographs of the numerous bridges, sometimes more than 100 ft. high, across the valleys and gorges in the mountains; then, descending to the "Campagna" round Rome, we have the "Piscinæ" and the arcades, till we arrive again at the walls of Rome. It is shown that one of the finest of the aqueducts, which has been called for the last century or more "Aqua Alexandrina," because it was supposed by Fabretti to have been built by Alexander Severus, is really of the time of Trajan and Hadrian, two centuries earlier. This is proved by the construction of the arcade, and of the walls of the *castella aqua*, or reservoirs, by the side of it. It is also confirmed by an inscription of Hadrian found on the first reservoir near Gabii, by Visconti, in the last century, since the time of Fabretti.

As a chronological series, the photographs are intended to supply a type for each half-century, from the time of the foundation of Rome to the sixteenth century; and they apply to the buildings over the greater part of Europe, as the history of architecture shows that the art of building in stone came from Rome, or through Rome to all the provinces of the Roman empire, and the construction of walls in each century is everywhere the same. This series affords important help towards a real history of architecture, such as no drawings can supply. Few drawings can be relied on as to the absolute proportion of the stones or bricks, or of the mortar in the joints between them; yet these are details which are often the best guide to the age of the building, or at least of the original parts of it, and which enable us also to see the changes that have been made.

The tombs and cemetery chapels, the fresco paintings in the Catacombs (taken with magnesian light), the mosaic pictures in the churches from the fourth century to the fourteenth, are extremely valuable for the history of drawing.

The mosaic pictures with which the churches are decorated date from the time of Constantine, and a large proportion of them are before the tenth century, a period when we have no churches or other buildings in the West. At a later period, the beautiful church furniture of the Cosmati family, their altars and ambones, and Paschal candlesticks and tombs, enriched with their admirable ribbon mosaics, are not to be found out of Italy. Of these there is a fine series of photographs.

Concerning the constructions of walls, Mr. Parker has elsewhere said,—

"For the construction of walls, the brickwork of the time of Nero is the finest in the world. The bricks with which the walls are faced are so thin that we can count ten to the foot, including the mortar. This perfection did not continue long. In the second century there are eight to the foot, in the third century six, and in the fourth century four only, as in modern brick walls. This is a useful general guide to the age of a building in Rome, because the walls frequently remain when all the ornament has been destroyed. The Roman temples of the first century were better than at any other period, but their marble temples were never equal to those of Greece, and some of the largest and finest buildings in Rome belong to the second and third centuries, although their details do not equal, in purity, those of the first. The magnificent thermæ of the Antonines, called after Caracalla, are not equal in the construction of the walls, or in the architectural details, to the thermæ of Titus and the House of Nero; but there can hardly be said to be any perceptible falling off in the buildings of the time of Trajan and Hadrian. Many of the temples were rebuilt by Septimius Severus in the beginning of the third century, and their old names retained, as we are expressly told by the historian of his life; and this is a point always to be considered in examining the Roman temples."

Public bodies,—the British Museum, for example,—ought certainly to become possessed of a set of these photographs, and so aid in an important undertaking. Individuals would find selections of great interest might be made from them. The photographs that have been taken by artificial light in the Catacombs may serve to dispel some illusions as to dates.

LECTURE BY MR. SCOTT ON CHESTER CATHEDRAL.

A CROWDED and enthusiastic meeting in promotion of the restoration of Chester Cathedral, which was held in Liverpool in St. George's-hall, on Tuesday in last week, was followed up, in Chester itself, by a lecture from Mr. G. G. Scott, the architect for the restorations. The lecture was delivered in the fine room which is now called the King's School, and which was formerly the Refectory of the Benedictine Abbey connected with this church. The Dean was in the chair, and made a few prefatory remarks, dwelling especially on the importance of ultimately including the great south transept with the nave and the space under the tower, in one general restoration, so that the whole interior might be seen in its ancient dignity.

Mr. Scott, in opening his lecture, said that unlike the majority of the great Mediæval churches, the origin and date of the foundation of this cathedral were unknown. Chester having been a Roman city, it followed that it must, during the last century of the Roman occupation —when the empire was Christian—have possessed churches, and one might have stood upon this site. The same might be said of the interval between the departure of the Roman legions and the Anglo-Saxon conquest—a period prolonged in this instance through the district which included Chester having been held much longer by the Britons than most parts of England. They were Christians, and must have had churches, and one might have stood here. Whenever founded, the original church was said to have been dedicated to St. Peter and St. Paul; and Mr. Parker conjectured it to have been Romano-British. During the Anglo-Saxon period, however, the dedication of the church was changed from St. Peter and St. Paul to St. Werburga and St. Oswald. This was at least as early as the reign of Athelstan, as he and several later kings are recorded as having paid their devotions at St. Werburga's Church. The lecturer then referred at some length to the personal histories of the Princess, St. Werburga, and St. Oswald, King of Northumbria, as a reason for the change of dedication. A century and a half later we find the church to have become ruined, probably during the second great Danish invasion, and restored or rebuilt during the reign of King Edward the Confessor, by Leofric, the wise and great Earl of Mercia, and the pious Countess Godwina, or Godiva, of famous memory,—the restored English rule thus again doing homage to the memory of their royal English saints; nor, when our country fell once more under foreign domination, was their memory dishonoured; for the first Norman Earl, Hugh Lupus, sister's son to the Conqueror, and his countess, Ermentruda, refounded the church on a far grander scale, converting it from a church of secular canons (just such a collegiate body as now exists) into a Benedictine monastery; and that not at the instigation of the English alone, but of the great foreign ecclesiastic, St. Anselm, then Abbot of Bec, but soon to become Archbishop of Canterbury. Thus we have had in review a long series of kings, princes, and rulers, as well as of royal and noble ladies—century after century—promoting the interests of this church; and we find that this only shared with many others their pious and princely munificence. Yet it is now as much as we can do to get funds to keep the few great churches which remain to us of their great foundations in a state of decent repair!

Not only was it customary with the Normans while dealing with the ecclesiastical structures of their predecessors, to make a clean sweep and reconstruct them on a greatly enlarged scale, but the change from a comparatively small collegiate institution to a great monastery of necessity involved this. It is, therefore, not to be wondered at that no vestige of the older buildings remain. Our architectural investigation must consequently commence with the new foundation begun by Hugh Lupus about 1195. The previous church, if only a restoration of the older Saxon church, was probably of no great dimensions. The surviving portions of Norman work, especially in the north transept, were next described. About 1195 the eastern parts of the building appear to have been much dilapidated, and appeal for help was made by the monks in a lugubrious tone. An interesting period followed, marked by the frequent presence of King Edward I. in Chester, when grants of venison from the forests of Wirrall and Delamere were made to the workmen who were carrying on the work of construction, under the vigorous rule of the Abbot Simon of Whitchurch. One of the most attractive parts of the lecture consisted in the description given of the methods by which the true forms of buttresses and cornices, and especially of the singular terminations of the south aisle of the choir, had been discovered by the help of fragments disinterred in the process of reconstruction.

Towards the close, Mr. Scott said,—You will have gathered, from what I have narrated, that your cathedral, though its beauty is now so sadly dimmed by decay and barbarous repairs, is a building of great architectural merit, and of great antiquarian value. I will add, that few of our cathedrals exhibit a more complete consecutive series of specimens of the different varieties and chronological phases of our Mediæval architecture, from the Norman conquest to the Reformation. Of the earliest Norman we have a specimen in the north transept. Of the middle Norman we have the remains in the north-western tower and the substructure of the abbot's hall, with, perhaps, the recesses for tombs in the north wall towards the cloister; of yet later Norman, we have the passage from the

abbot's house to the cloister, with the chapel above it; and later still the doorway from the eastern cloister into the nave. Of the transitional style from Norman to early English, we have the eastern chapel of the north transept, now the vestry; also some beautiful fragments lately discovered. Of the fully-developed early English, we have the chapter-house, with its vestibule, as beautiful works as could well be produced. We have also the beautiful refectory of the monks in which we are now assembled, and which contains one of those exquisite pulpits—such as we find at Beaulieu, at Shrewsbury, at St. Martin aux Champs at Paris, and in many other monasteries. Of the transition from early English to the Middle Pointed or Decorated style, we have the Lady Chapel; of the somewhat more advanced decorated, we have the two eastern bays of the choir aisles, with a further advance in their western bays and the clearstory. Of the later decorated, we have a truly magnificent example in the south transept, and smaller ones in the substratum of St. Werburg's shrine, the sedilia, and the choir-screen. Of the early Perpendicular, I should have thought that we had specimens in the clearstories of the south transept of the eastern bay of the nave; of the more advanced style, in the central tower, and in the stallwork of the choir; of the latest phase, in the west end, and probably in the clearstory of the nave. The cloisters also belong to one of these two last phases. Thus we should have the whole series of changes which the middle ages produced represented in this one cathedral—all alike, however, clouded by decay, and all crying equally loudly for restoration. It is for you to respond to that cry, and to render this, the great central temple of God in your diocese, worthy at once of its sacred uses, of its rank, as the great diocesan church, and of the importance of the diocese, including, as it does, some of the most princely residences of the nobility, and the greatest mercantile emporium of the greatest commercial country in the world. The church has come down to our day—what with decay and barbarous repairs—a mere wreck of what it once was—a melancholy relic of former ages, and a reproach to our own. It is for you to do honour at once to the past and the present, by liberally aiding your most excellent and zealous dean in effecting its proper restoration.

After a vote of thanks had been given to the lecturer, the company followed him from the King's School to the Chapter-house, where he commenced to point out in detail those features in the cathedral to which he had referred in his lecture. The Chapter-house he regarded as one of the most beautiful rooms of the thirteenth century. Its exact age was not known; probably it might be placed in the latter quarter of that century. In its predecessor many of the abbots, including the famous Whitchurch, were buried, but what became of their tombs he could not say. He thought it probable that the light of the western window was borrowed, and that at one time the monks' dormitory came up to it. Passing to the north transept, he called attention to the veritable work of Hugh Lupus, which was to be seen in the arcade over the head of the arch. From the eastern side, up to the end of the twelfth century, projected an apsidal chapel, and the outline of the arch by which that was entered has been disclosed by the taking off of the plaster. The piscina was not earlier than 1190 or 1200. Passing through the vestry, where the details of the Norman arch were more clearly disclosed, Mr. Scott then led the way to the outside of the north aisle, where he called attention to the base of one of the enormous buttresses, then to the corner of the Lady Chapel, where the lighter buttresses were found which gave the true position of the windows and the direction of the mullions. On the south side of the Lady Chapel he called attention to the pierced parapet and toothed ornament, discovered when the roof was removed, and also pointed out the arch above the end of the south aisle, which bore a spire, and the aisle, about being constructed in an apsidal form. Farther on he noticed the sloping form of the buttresses, and a doorway which the Dean said was used as an entrance to the choir at one time by the Benedictine monks, the tomb of the author of the "Polychronicon" being near it. The Lecturer passed on to the south transept, then into St. Oswald's Church, where he spoke of the chapels of St. Nicholas and Mary Magdalen, and pointed to the sedilia of the former. From thence the route was into the south aisle, through the choir, to the end of the north aisle, but not into the Lady Chapel, then back to the choir, and through the nave to the westward, and into the Norman tower; but here, we believe, the perambulation ended, as it was near five o'clock, the time for evening prayers.

ART-UNION OF LONDON.

THE following is a list of the principal works selected by prizeholders to this date:—

From the Royal Academy.—"Move Eastward, happy Earth," &c., C. J. Lewis, 150*l.*; Henry II. and Diana of Poitiers, A. H. Tourrier, 150*l.*; The Village Violinist, E. Opie, 50*l.*; A Mountain Stream, Aber, North Wales, J. Taylor, 50*l.*; Near Bethesda, North Wales, F. Williamson, 20*l.*

From the Society of British Artists.—The Stile, W. Bromley, 60*l.*; River Rance, Dinan, Brittany, F. T. Lott, 50*l.*; Ennui, T. Davidson, 42*l.*; A Jersey Interior, W. A. Atkinson, 40*l.*; The Forsaken Nest, J. C. Waite, 40*l.*; The Lledr, J. Peel, 35*l.*; Temple Weir on the Thames, A. A. Glendening, 30*l.*; Rhayadr Du Falls, Dolgelly, H. P. Powell, 30*l.*; Fishing Village, Coast of Normandy, J. J. Wilson, 30*l.*; Life and Still Life, C. T. Bale, 25*l.*; A Mountain Stream, North Wales, A. Barland, 25*l.*; The Thames at Wargrave, G. S. Walters, 25*l.*; Scarborough, A. Clint, 25*l.*; Flirting, C. Armytage, 21*l.*; The Path by the Loch, A. A. Glendening, 20*l.*; Evening on the Wye, F. Muschamp, 20*l.*; Evening, C. L. Coppard, 17*l.*; Waterfall at Loch Eck, on the Clyde, J. Burbidge, 15*l.* 15*s.*; Tired from the Glean, Mrs. Backhouse, 15*l.*; The Resting Place, E. Holmes, 15*l.*

From the Royal Scottish Academy.—Shiehallion—Sabbath Morning, S. Edmonston, 30*l.*; a Fortune in a Teacup, J. C. Waite, 27*l.* 10*s.*

From the New British Institution.—The Jungfrau, from the Road to Mürren, S. Hodges, 100*l.*; Blue Bells, H. Wallis, 70*l.*; Ophelia, H. Selous, 42*l.*; Glen Etive, near Glencoe, J. Docherty, 42*l.*; "Not Enough," A. T. V. Ball, 30*l.*; Girl and Thrush, A. F. Patten, 30*l.*; Moonlight on the Coast, A. Gilbert, 20*l.*

From the Society of Painters in Water Colours.—The Rialto, Venice, W. Callow, 50*l.*; Isola Bella, &c., C. Smith, 45*l.*; Bay of Naples, E. A. Goodall, 31*l.* 10*s.*; Amongst the Apple Trees, J. J. Jenkins, 30*l.*; Primrose-gathering, P. J. Naftel, 25*l.*

From the Institute of Painters in Water Colours.—Limburg, with the Cathedral of St. George on the Lahn, E. Richardson, 94*l.* 10*s.*; On the Avon, at South Brent, Devon, J. H. Mole, 50*l.*; From the Capo-di-Monte, Naples, T. L. Rowbotham, 25*l.*; At Chilstom, near Torquay, John Chase, 15*l.* 15*s.*

From the General Exhibition of Water Colour Drawings. The Awakened Conscience, J. Hayllar, 40*l.*; Moelgesd, Portmadoc, North Wales, J. Needham, 15*l.* 15*s.*; "Waiting, Watching, Hoping still," J. C. Russell, 15*l.*; The Winner Won, Ellen Thornycroft, 15*l.*

From the Old Bond-street Gallery.—Flushing Boats fishing—Boats running into Harbour, T. S. Robins, 31*l.* 10*s.*; On the Moor above Cladich—Loch Awe, J. J. Bannatyne, 25*l.*

ON THE CHEMISTRY OF POTABLE WATERS.*

IT is not my intention to give an account of the functions performed by water as a physical agent; of the wonderful changes it has worked and is working upon the face of the globe; of its power as a transporting agent; nor, indeed, of the manifold purposes to which it is turned into usefulness by the ingenuity of human intellect. Yet, as a reservoir, as a store, as a source of power, I may just mention that we possess an immensity in our tidal rivers and around our coasts, which as yet is almost undreamed of in our philosophy; its magnitude is such that when viewed side by side with all the combined steam power of Britain, the latter appears insignificant and microscopic; and in the hands of a Wellington in science greater changes by far may be effected from this source than from the steam of Watt and of Stephenson. But I will lay before you some of the leading characteristics of water as employed for sanitary purposes, such as they occur to me; will point out their impurities, their source and mode of detection, examination, and possible estimation.

Passing over the modes in which chemists formerly examined water, I come to the

Nitrogen, Carbon, and Ammonia Methods.

In the present day, I believe, there are only two methods of approximately determining the value of domestic water. The first is known as Frankland & Armstrong's gasometric system, and the second as Wanklyn, Chapman, & Miles Smith's ammonia system. Between each set of inventors there exists great rivalry, each insisting upon the accuracy of their system to the detriment of the other. Of this rivalry I will merely note my belief that, *theoretically*, Frankland's process is as perfect as any process is ever likely to approach; while, in practice, Wanklyn's ammonia method is much to be preferred. This being so, I shall give you a brief outline of the gasometric mode of Frankland, and then proceed to a more detailed and illustrated account of that of Wanklyn, premising that the results are such as I have myself personally obtained.

* By Mr. Richard Weaver, C.E.

Frankland & Armstrong's Gasometric Process for the Analysis of Organic Matter in Water.

These chemists endeavour to show, not the actual weight of organic matter present in a given bulk of water, but that of some of its constituents, and also some of the products of decomposed organic matter, which latter is termed by Frankland "the skeleton of sewage." First, the organic carbon and the organic nitrogen. These are converted into gas, and measured as carbonic acid and as nitric oxide. Second, the nitrates and nitrites; and, lastly, the ammonia. By this means the whole of the nitrogen contained in the water is valued, and a distinct estimate is made of the nitrogen rendered harmless by oxidation, and of that which yet exists as putrescible organic matter.

The first operation is to evaporate a known bulk of water to dryness with a prior addition of sulphurous acid, to expel all carbonic acid from carbonates, and also to destroy the nitrates and nitrites; the residue now contains the whole of the nitrogen of the organic matter and the nitrogen of the ammoniacal salts; and by making a separate estimation of the latter,—through the Nessler test, to be hereafter described,—and subtracting this from the total nitrogen obtained, we arrive at that corresponding to the organic nitrogen.

The process by which these determinations are made somewhat resemble the combustions in organic analyses, but are much more complicated, and require greater delicacy of manipulation.

As an indication to the limits of this test, it is stated by Frankland that the $\frac{1}{83000}$ part of a grain of nitrogen and the $\frac{1}{1000000}$ part of a grain of carbon can with certainty be determined.

I shall not enlarge upon their mode of estimating the quantity of nitric acid; I have already indicated it is done as nitric oxide and the volume of gas measured off.

But I must draw your attention to a characteristic point in all the analyses of waters by Frankland, and notably indicated in the recent report of the Royal Commission for Rivers Pollution, and in the examination of the metropolitan waters.

I refer to "the previous sewage contamination" column of such analyses. This question is a moot point with chemists, some considering it almost a worthless indication, and others insisting upon its great value in deciding the relative goodness or badness of potable water.

For my own part, I incline to think it as a somewhat vague term, and calculated to mislead the public, not as being worthless in its indications, but as really showing too little.

By the term "previous sewage contamination" would generally be implied the actual quantity of sewage with which a water was, or had been, contaminated at the period of its examination; but such is not the case, as I read Frankland's definition of the term, which, expressed in a few words, means the actual present amount of the *skeletons* of sewage,—of that which *was*, and has no reference to that which is at the present moment active and living sewage!

From which it follows that, probably, a water may contain variable quantities of sewage, and yet, according to the "sewage contamination" column of Frankland, no return would be made, and, by inference, that no sewage was present. That this is so, I may mention, a certain water was examined repeatedly by me, at intervals—which said water shall be nameless—and I always found indications of sewage matter; and, on turning for verification to Frankland's sewage contamination column, in his analysis of the same water, I found that *no* previous sewage was present. Now, this may be considered as either discouraging or encouraging, as viewed from opposite motives; and yet it is easily explained from the fact of my showing active and putrescent sewage, or analogous matter, whereas Frankland's column merely shows that which was ancient sewage, but is now no longer sewage. And for this, as one ground of objection, I must protest against the term, "previous sewage contamination," as being vague and delusive.

We now arrive at the method devised by Professors Wanklyn, Chapman, and Smith for determining the organic matter in water by

The Ammonia System.

Coupled with this, I shall introduce you, somewhat briefly, to a general system of water analysis, as suggested by these gentlemen, premising that much of it is obtained from older methods, now broken up and partly re-absorbed

in modern systems. I divide the course into six divisions, as follow:—

1st. Hardness.
2nd. Chlorine.
3rd. Total residue and loss on ignition.
4th. Nitrates and nitrites.
5th. Ammonia.
6th. Organic matter.

Hardness.

The hardness of water has reference to its soap-destroying powers, and is caused by the oxides of calcium, magnesium, and iron, combining with the fatty acids of the soap forming insoluble salts; and, so long as any of the earths remain in solution, the soap cannot exercise a detergent action: hence the value of soft water for cleansing purposes. This which I now hold before you is a solution of soap in aqueous spirits of wine, and is standardised by a somewhat tedious process to an equivalent of 16 grains of calcic carbonate per gallon of water; or, in other words, corresponds to 16 degrees of hardness, and with 1,000 grains of water of such hardness, 32 test measures, or 320 grains of soap solution, will just neutralise, and cause a lather to form, on thoroughly agitating, and will last about five minutes.

Upon such a water I now operate, and note the result.

Chlorine.

The reason is for determining chlorine in a potable water that it points to a possible origin in sewage, for no sewage can exist in water without chlorides being present, sewage being rich in chlorine, especially from the urine. Yet, on the other hand, chlorine may very probably be present without any sewage, and it becomes a problem whether its source is due to sewage or to the geological character of the strata through which the water may have flowed.

The determination of the quantity of chlorine is very simple, and yet wonderfully accurate.

We first prepare a solution of argentic nitrate in pure distilled water, and to a known strength. To the water under examination we add a few drops of neutral potassic chromate, and then the silver nitrate,—as in the experiment now before you,—until a faint tinge of reddish coloured silver chromate denotes the end of the chlorine reaction; and from the amount of silver solution employed we estimate the chlorine.

Total Solid Residue, &c.

For this experiment it is essential that the quantity of water employed shall be very accurately measured, and that a delicate balance is at command, because each millegram—about $\frac{1}{65}$ part of a grain—of residue is equivalent to 1 grain per gallon of water.

The apparatus which is usually employed for the purpose of estimating the total solid matter contained in a water consists of a small copper or tinned vessel for generating steam. Through the mouth of the vessel passes a perforated cork, and again a large glass funnel; into this latter is arranged an accurately weighed platinum dish. We now take 70 cubic centimeters of the water under examination, and place it in the platinum dish; steam, being generated in the lower apparatus, rises through the funnel, and, acting upon the platinum dish, the water contained therein is quickly evaporated—in fact, in practice, I find that about forty-five minutes are amply sufficient time for the purpose. The dish and its contents being now well dried and weighed, the excess of weight over the first weighing represents the amount of solid residue. If it is further desirable to ascertain the amount of loss on ignition, we carefully burn off all carbonaceous matter, at a faint red heat. Moisten with ammonia carbonate, well dry, re-weigh, and the difference represents the volatile matter. This process, as previously stated, is of very little value in estimating the character of water.

Nitrates and Nitrites.

These are the skeletons of Frankland's sewage, and the mode by which their quantity is determined is exceedingly elegant.

We take a retort, and introduce 100 c. c. of water, to this add 60 c. c. of caustic soda solution free from nitrates, &c. The contents are now distilled until about 100 c. c. remain within the retort, and until the Nessler test is incapable of showing ammonia. Into the retort on cooling is added a small piece of the metal aluminium; it is closed with a cork, through which passes a small tube in the manner I now show you; it is filled with pieces of broken-up tobacco-pipe, or analogous matter, and moistened with dilute chlorhydric acid. On standing for a few hours, the action is complete; the whole of the nitrates have been resolved into ammonia, and the ammonia, being distilled off, its quantity is determined by the Nessler test.

The process is so exceedingly delicate that it may be termed microscopic; indeed, a very small fraction of a grain of nitrates per gallon being readily ascertained. As to the relative value of the nitrates in a water in determining its quality, there is much difference in opinion, some chemists allowing that considerable quantities may be permitted without detriment, whereas Frankland would probably condemn a water if even a gallon contained but half a grain of nitrates!

Ammonia.

The estimation of ammonia in water may fairly be considered to belong to the domain of microscopic chemistry when the Nessler test is employed.

I will first describe this test. We dissolve 50 grammes of potassic iodide in a little hot distilled water, placing the dish in a water-bath, and adding a strong solution of bichloride of mercury. We continue the mercury solution until a point is reached at which the red precipitate formed no longer dissolves on agitation. We then filter, and to the filtrate add 150 grammes of solid caustic soda in aqueous solution, and then dilute the whole to the volume of 1 litre. A further addition of about 5 c. c. of mercuric chloride imparts sensitiveness. Allowing all sediment to settle, and pouring off the clear fluid, we have the Nessler reagent such as I now show to you.

If we take a water containing a trace of ammonia, and add the test, we obtain a yellowish brown colouration; and according to the intensity of this colour we calculate the amount of ammonia present.

We have now arrived at a stage in water analysis when we determine the presence of matters that are of prime importance in judging of quality; that is, the ammonia and the urea, and it is astonishing the minute difference in quantity which marks the point between waters that are foul and stinking, and waters that are good and wholesome.

The Albuminous Substances.

The most important of all the substances to be sought for in water intended for domestic purposes, is undoubtedly the nitrogenous organic or albuminous matter, and it is primarily by this test we judge of the antecedents of water, and the character and source of its contamination. It is simple and elegant.

To the remnants of the last experiment we add a strongly alkaline solution of potassic permanganate, and distil off not less than 200 c. c., and until Nessler ceases to show the presence of ammonia; for you must understand that the action of the permanganate is to cause most of the nitrogen from the organic nitrogenous matter—not nitrates—to be evolved as ammonia, and by estimating the quantity of this we have a fair idea of the quantity of organic matter on multiplying the result by ten.

The delicacy of these tests is truly wonderful, for we can directly estimate ammonia in water when its weight does not exceed the $\frac{1}{10000000}$ part of the water in which it is dissolved; and when we concentrate by evaporation or distillation, we increase its delicacy *at least* ten fold. We have now arrived at the end of our chemical examination of potable waters, and I will just add a few works as the characteristics of really good water.

It should be clear, colourless, and transparent when viewed through a considerable stratum; it should be perfectly free from smell, both at the ordinary temperature and when heated to about 90° Fahr. It is well also if a little lime or baryta water be added previously to warming; its hardness must not be excessive, and, above all other considerations, it must be free from sewage matter. This is of vital importance, for we have it on record for years past, and, in fact, there is not a summer or an autumn comes without hundreds of human beings that are carried away to an early grave from the use of water polluted with sewage; and excepting in the very vilest of waters, its presence cannot be detected excepting by competent chemical examination, for it is an ascertained fact that waters which are clear and fair to look upon, that are beautiful and sparkling to the eye, may, nevertheless, be veritable poison-cups.

Before closing, something will possibly be expected upon the second phase of water—that is, sewage. Much has been said and written upon this subject of late years; but very little has been accomplished towards solving the problem of what shall we do with our towns' sewage, as you are aware there are at this present moment three systems in vogue; viz.:—

Deodorisation with disinfection, of which the ferric chloride process is a type.

Secondly, the precipitation process, by which a portion of the mechanically-suspended matter in sewage is thrown down, of which the lime, the alum, the clay, and Sillar's processes may be given as types. In this class are attempted to be accomplished the objects of the first, and also to derive a profitable manure; and I scarcely need remind you that they generally fail in the first object, and some of them in the second.

Thirdly, deodorisation disinfection, and a profit is endeavoured to be attained by the irrigation of land with sewage. This is a very ancient mode; indeed, it appears to be coeval with man. Like everything else, chemists and others differ as to whether this system of treatment is really efficient, some contending that the effluent water flowing from off the land, after its functions are here ended, is not in a much better condition than when it was turned on. Now, this objection seems to me, after some years' consideration of the subject, observation in various parts of the world, and a trifle of experiment, to be a very futile objection; for it is evident, upon reflection, that a sufficiency of filtration through, and not over, porous soil has not been attained; for, I take it, the absorbent power of soil will not be called in question, or what is the use of manure?—it must needs be washed away by the first smart shower. There are others—for example, the Rivers Pollution Commissioners—who contend, and I go with them a long way, that the water, as a rule, flows away remarkably pure, deprived of 90 per cent. of its impurities—the amount I give from memory—and this, you will understand, is in practice; but I go further, and contend that 99 per cent. should be removed, being, however, fully aware that greater filtration is requisite,—not ordinary filtration, but that through land, nature's grand disinfectant.

There is, however, another objection to irrigation, viz., that a nuisance and probable danger are created by putting sewage upon land in the first instance; that is, the sewage being in an active stage of decomposition on arriving at the place of absorption by the soil, the gases of decomposition are diffused through the air at all points between the places of absorption and first contact with the open air. This I conceive to be a feasible objection, within certain limits, upon these grounds:—It is a condition of all matter to undergo decay and change through decomposition; it is thus with sewage, especially animal sewage,—a medium between that which was and that which will become life. Under certain conditions, especially of temperature, this decomposition is actively promoted; and I concede that from some causes,—either of distance or of time,—a sufficiency of decomposition may have been attained to create a nuisance and a danger at the points of distribution of the sewage in question. Now, this is a condition I have long foreseen may probably arise, and have from some attention and a little experiment endeavoured to contribute my mite towards the knowledge tending to a solution of the problem.

I need not give you any details of all the schemes that entered my mind and were developed by experiment: suffice it that that which I found the most successful was chlorine, another was oxygen, but I will now only trouble you with the former. This from limited experiment I find to answer the required purpose; it acts instantly upon the organic matter of sewage; upon that in a putrescent state, the gases are fixed or decomposed, ammoniacal salts are secured in the water, deodorisation and disinfection are so effected that after a lapse of even weeks not a trace of unpleasant odour is perceived, and when this sewage is freed from suspended matter you cannot from mere external evidence tell it from the finest potable water.

The process I propose is something after this manner: chlorine to be generated by the perpetual regeneration scheme of Walter Weldon, in which chlorine is obtained from chlorhydric acid through the agency of manganic oxide, the same oxide being used over and over again for hundreds of times; so that the expense is reduced to that of the chlorhydric acid, the labour, and wear and tear of plant; and you are aware this acid is cheap enough, being a waste product of the alkali works, and can be purchased in a concentrated state at 40s. or 50s. per ton,—

a sufficiency, I believe, to treat millions of gallons of sewage

I shall now conclude this exhaustive lecture,—that is, exhaustive of your patience and good-nature—not the subjects, for of these it is a mere outline,—and give you some idea of the value of sewage, from a calculation I made recently, based upon an average of fifty samples of Leicester sewage. The value of the ammonia alone in a year's flow, if placed upon the market and sold at current rates, would realise very nearly 40,000*l.*; and this substance, although by far the most valuable constituent, is not the only one, for we have the phosphates, and the alkalies and others; and you will agree with me that there could be no honour too great for the State to confer upon that man who shall effectually solve this problem of utilisation of waste, although I do not believe it will ever fall to the lot of any individual to achieve undivided success, but will rather burst forth spontaneously from many minds, and will attain success, as have all the great events of modern days,—like our railways, our steamers, and our electricity.

FILTRATION OF TOWN SEWAGE.

THE new Royal Commission, appointed in 1868 to inquire into the best means of preventing the pollution of rivers, took up the subject where the former Commission had left it,—that is, after the Thames, the Lea, and the Aire and Calder basins had been reported upon, and have now issued their report on the Mersey and Ribble basins. They come to the same conclusions as the former Commission did in respect of the irrigation of land with town sewage being the best means of preventing the pollution of rivers with it, as well as being the most profitable in application; but they state the case in a different way to that in which the former Commission put it. They say that sewage may be sufficiently purified to be allowed to flow into any river or other watercourse, from which it is not intended to take water for domestic use, by *filtration* through sand or porous soil, as distinguished from the view that some persons take of irrigation, which is, that the sewage is purified by running over the surface of the land in a thin sheet, parting with some of its manurial elements to the plants, and storing the remainder in the top soil for the use of the next crop, or rather for the use of the crop first sown after re-ploughing the land; whereas the present Commissioners say that it is the filtration through a sufficient thickness of sand or porous soil that constitutes the efficiency of this method of utilising sewage; and that, therefore, its purification is insured by passing it through constructed filter-beds equally well as by passing it through the natural soil of the land. This they have ascertained by experiments with several kinds of soil, with sand, and with sand mixed with coarsely powdered chalk. The difference between filtration through constructed filter-beds and through the soil of the land is one not of efficiency of purification, but of the profitable application of the sewage, the former method being unremunerative, while the latter is remunerative. But it is consolatory to know that in places where land cannot be had for irrigation, the sewage may yet be sufficiently purified to be allowed to flow into rivers, although the value of the solid part of the sewage which is retained may not be of much value. The value of it will evidently depend on the quickness with which it can be extracted in respect of the length of the time elapsing from its entry into the sewers to its extraction at the outfall. Where the gradients are considerable, and the mean distance of the outfall from the town is not very great, it may be arrested in a fresh state; and, mixed with street sweepings and other town refuse, may become of considerable value; while, where the gradients are slight, and the outfall at a greater mean distance from the town, it may become so far decomposed in its transit as to be of no value as a manure.

The Commissioners estimate that for a town where water-closets are in general use (therefore requiring a larger area than would be required where they are not so numerous), 5 acres of filtering surface, and a depth of material of 6 ft., are sufficient for a population of 10,000. According to their experiments, something of this depends upon the nature of the soil or other material used for the filter-bed, the qualities of various soils for this purpose differing; for while soil procured from Dursley, in Gloucestershire, purified sewage at the rate of 9·9 gallons per cubic yard per day, soil from Hambrook, near Bristol, did not satisfactorily purify more than 4·4 gallons per day per cubic yard. Again, soil from Beddington purified sewage of the same strength at the rate of 7·6 gallons per day, while that from Barking did not purify it at a greater rate than 3·8 gallons, or peat from Leyland Moss, near Preston, at a greater rate than 4 gallons per day per cubic yard of material.

Considering that "filtration" has already often been employed to purify sewage, and has always hitherto failed, it is rather startling to see it so confidently recommended, until we remember that both the methods of filtration that have failed for sewage also failed for water many years ago; that is to say, the horizontal method and the upward method, while, as soon as the late Mr. James Simpson rearranged the filter-beds of the Chelsea Waterworks at Thames Bank many years ago, and made the water to descend instead of ascend through the filtering medium, the question was then and thereafter settled as to whether water should be filtered upwards or downwards. Every engineer since that time,—every engineer, that is to say, who has had the knowledge to perceive the difference between a true and scientific and a false and empirical method, or who has had the honesty to acknowledge that he was not the inventor of the practice he has adopted,—all these men have adopted the downward system of filtration of water. And so we find the Commissioners—or, shall we rather say, Dr. Frankland, one of them?—condemning the system of upward filtration now in practice at Ealing, and giving the reason why downward filtration is so effective in purifying sewage. The system at Ealing is to force the sewage upwards through a filtering medium constantly, thereby effecting no proper purification at all; but by making the sewage to descend for six or twelve hours through one bed, then shutting it off from that bed, or compartment, and turning it on to another for a like space of time, and so alternately, the descent of the sewage through the interstices of the material on either bed is followed by atmospheric air; the air, that is to say, that occupied these interstices before the sewage began to descend, and has been used up in oxidising and transforming, and therefore purifying, the former quantum of sewage, is replenished after the descent of each quantum of sewage through each bed, and so by continual periodical renewals of the proper aëration of the filtering medium it becomes a constant purifier of the sewage; for, although this method of filtration in the case of water has mostly been called a mechanical one only, yet in the case of sewage filtration, the same method is said by the Commissioners to be both mechanical and chemical.

In order that there should be no ambiguity about what they recommend, and its attainment, they give a standard of impurity beyond which they think the water of sewage ought not to be admitted into rivers or other watercourses. They suggest that the following liquids be deemed polluting and inadmissible into any stream:—

"Any liquid containing, *in suspension*, more than 3 parts by weight of dry mineral matter, or 1 part by weight of dry organic matter in 100,000 parts by weight of the liquid.

Any liquid containing, *in solution*, more than 2 parts by weight of organic carbon, or ·3 part by weight of organic nitrogen, in 100,000 parts by weight.

Any liquid which shall exhibit by daylight a distinct colour when a stratum of it, 1 in. deep, is placed in a white porcelain or earthenware vessel."

So far the standard is applicable to any town. But the Commissioners, having before them the question primarily of the pollution of the rivers Mersey and Ribble, which traverse the manufacturing part of the county of Lancaster, found it necessary for that district to prohibit,—suggest, rather, that they should be prohibited,—many kinds of pollution peculiar to the manufactures of those parts, *e.g.*:—

"Any liquid which contains, *in solution*, in 100,000 parts by weight, more than 2 parts by weight of any metal except calcium, magnesium, potassium, and sodium.

Any liquid which contains, whether *in solution or suspension*, in chemical combination or otherwise, more than ·05 part by weight of arsenic.

Any liquid which, after acidification with sulphuric acid, contains, in 100,000 parts by weight, more than 1 part by weight of free chlorine.

Any liquid which contains, in 100,000 parts by weight, more than 1 part by weight of sulphur, in the condition either of sulphuretted hydrogen or of a soluble sulphuret.

Any liquid possessing an acidity greater than that which is produced by adding 2 parts by weight of real muriatic acid to 1,000 parts by weight of distilled water.

Any liquid possessing an alkalinity greater than that produced by adding one part by weight of dry caustic soda to 1,000 parts by weight of distilled water."

The opinion of the former Commission was that sewage could not be filtered. "As applied to sewage, disinfectants do not disinfect, and filter-beds do not filter," they said. Sewage applied constantly to a filter-bed on the upward system does not purify sewage continually, certainly; and if that was the system meant to be understood, the former Commission were clearly right in their statement, but on the downward system the case is different. Any one who remembers the condition of the Thames when the Lambeth Company took their water from a point of the river near Hungerford Bridge, and when the Chelsea Company took their supply from Thames Bank, may well compare the water then taken from the river for the supply of a large part of London with the town sewage of to-day. The reports of the engineers were constantly that the water was "turbid;" but that word, as now used sometimes to define the condition of the Thames water, conveys no idea of the state of the water at that time. In comparison with the turbidity now sometimes said to exist, it might be called pea-soupy, or sludgy, and yet this very foul water was passed through filter-beds on the banks of the river, after subsidence in reservoirs, and transformed into the brightest and most pellucid water, as drawn from the filtered water-well. No doubt the surface of the filter-beds often required cleaning; the mud deposited soon stopped up the pores of the sand so that no more water would pass, and this necessity of frequent shutting off and turning on of the water may have been the cause, as illustrated by the view the present Commission take of the subject, why these filter-beds were so perfect in action under such difficult circumstances; the air filling the interstices of the filtering medium—sand and gravel—after the mud was scraped from the surface of the sand, was replenished at short intervals, and so kept the filter-bed continually perfect.

Manchester being within the watershed of the river basin inquired into by the Commission, it became necessary for them to institute an inquiry into the merits of the privy and ash-pit system, as against the water-closet system, especially as that city is the great stronghold of this first-named system.

Agreeing with every other impartial inquiry into this subject, the present Commission condemn it. They illustrate the case in a remarkable way. They suppose all dwelling-houses, warehouses, &c., to be removed, and only the privies left—nearly 60,000 of them in Manchester and Salford—rows and streets, and crowds of them—scattered about almost as thickly in places as the heaps of manure upon a field that has just received a dressing from the dung-cart—each heap here, however, no mere barrow-load once a year, but a constant collection and continual soakage of filth, which has for years been polluting every corner to which air or water could have access. *Is this the site on which to build a healthy town?* Would it not be the first desire of every sensible man to sweep this filth away, to drain and aërate, and, if possible, to sweeten this land before a single dwelling-house should be built?

On the great question of establishing a River Conservancy Board, the present Commissioners agree with the recommendations of the former Commission, to the effect that it is highly desirable that such a Board should be established for every river basin; but on the secondary question of how and of whom it should be constituted, the chairman, Sir W. Denison, does not agree with his colleagues, Dr. Frankland and Mr. John Chalmers Morton, and on that subject they give separate reports. The chairman advises a parochial system; that the officers of such parishes as the stream flows through should be the persons responsible for the state of the river flowing through their respective districts, but, anticipating abuse of the powers placed in their hands, he recommends that they be made sufficiently responsible to the general government to enable the latter to check or prevent any such abuse, or to notice and reprove, and even to punish, all negligence or unfairness in the mode of action of the former. The initiation

of action is to be the complaint of neighbour against the conduct of neighbour.

Let us take a supposititious case, and inquire how this would be likely to work in practice. Suppose two of the uppermost mills or towns on a stream to use the water that comes to them with satisfaction to themselves, but that one or both of them foul it so as to be unsatisfactory to the third person or town, the one below them Of whom is the third party to complain? And of course, the difficulty is increased if three or more parties are satisfied, and the fourth or fifth complains. The boundary of the district over which each parochial Board is to have jurisdiction being coterminous with that of the parish, how are the officers of the parish injured to determine who above them has caused the injury? If all are complained against, who shall determine the degree in which each has contributed to the pollution of the river?

Dr. Frankland and Mr. Morton recommend that, inasmuch as there exist at present no local bodies competent to deal with questions connected with efficient river conservancy, capable of detecting pollutions and enforcing remedies, it will be necessary to call into action an authority possessing greater capacities and powers than those of the existing corporate bodies or local boards. The duties of this authority would be of two distinct kinds: the one would be those of a river police, employed in the detection of offences, and in obtaining the conviction of offenders; the other would include the investigation of and decision upon various works connected with rivers, proposed by either towns or individuals, such as schemes for water supply and for the defecation, filtration, or utilisation of sewage and other polluting matters, while local boards could obtain information on these points only from persons capable of investigating them. Nevertheless, under the second division of the duties of the central authority, the co-operation of the local corporations would be required for the efficient discharge of them. Indeed, if guided and assisted by a properly qualified central court, the present local boards would be quite competent to meet all local difficulties and to supply all local wants. A central authority would not extinguish the corporations and local boards at present existing in the river basins. It would, the Commissioners believe, materially promote the energy of local action by removing the obstacles which at present hamper it, and by giving a prompt decision to the questions which it has to solve.

SOMETHING ABOUT HIGHGATE.

MR. WILLIAM HOWITT, the author of many delightful works, has given, in his recent book, reviewed in these columns when it first appeared, particulars respecting Highgate.* From the top of the house he occupied there he could see the vast mass of all-devouring London spreading itself and ever increasing on all sides. Long after the Norman Conquest all this was the quiet Forest of Middlesex; for Fitz Stephen (c. 1175) thus describes its suburbs:—

"There are cornfields, pastures, and delightful meadows, intermixed with pleasant streams, on which stands many a mill, whose clack is grateful to the ear. Beyond them a forest extends itself, beautiful with woods and groves, and full of the lairs and coverts of beasts and game, stags, bucks, boars, and wild bulls. These wild bulls were probably buffaloes, or like the beasts of Andalusia, in Spain, which, I presume, are small." They were more probably like the celebrated cattle at Chartley and Chillingham (Northumberland). The forest was full of yews, which supplied the bows for the warriors of Cressy and Agincourt. It was disafforested in 1218, in the reign of Henry III. At this time, we must remember, that the whole population of England was only about 2,150,000. In 1377 London only had 35,000 people. Henry VIII. made a proclamation that as he was "desirous to have the game of hare, partridge, pheasant, and heron preserved in and about his honor, att his Palace of Westminster, for his own disport and pastime; that is to saye, from his said Palace of Westminster to St. Giles-in-the-Fields, and from thence to Islington, to our Lady of the Oke, to Highgate, to Hornsey Park, to Hampstead Heath, and from thence to the said Palace of Westminster, to be preserved for his own disport, pleasure, and recreac'on," &c.

Queen Elizabeth hunted in this preserve, and took up her quarters in Canonbury Tower. The residence of Sir Walter Raleigh still remains as the "Pied Bull" public house, Islington, not far from this Tower. At the latter end of the reign of Elizabeth the population of England was only about 5,000,000, and of London about 140,000. The Queen was so afraid of its increase that she ordered no more houses to be built. The Stuarts did the same, but all to no purpose. In 1625 there were only twenty hackney coaches in London; but Charles I. disliked them "because they obstructed the streets, and rendered them dangerous to his Majesty, his beloved consort, and the nobility." Very soon we shall see London increasing at the rate of 500,000 every ten years, an amount of population which it did not reach from the Conquest till the end of the seventeenth century.

Highgate is situated on a hill 400 ft. above the level of the sea, and for a long time was a mere hamlet of houses scattered here and there amid the forests. It was not till the fourteenth century that the Bishop of London allowed a highway to be cut through his park and woods of Harringhay (the hare-inge-hayh, or meadow and wood of hares). A gate was erected and toll taken, and the place is said to have been called Highgate from this gate; but what was the name of the place before that time is not known. The bishopric of London had extensive woods and demesnes beyond this gate reaching to the gate of Hampstead Heath, now the Spaniards Tavern, to Finchley, where the bishop had a palace.

The chapel of Highgate which occupied the site of a hermit's cell, was granted by Bishop Grindal, afterwards Archbishop of Canterbury, in 1565, to a new grammar-school, erected and endowed the year before by Sir Roger Cholmeley, late lord chief justice. This was pulled down many years ago, and the church built in another part of the village. Among the tombs, however, was that of Coleridge, the poet and philosopher. The church was built in 1832, at a cost of 10,000*l.*, in the parish of St. Pancras; but Highgate was soon afterwards made a district of itself.

The unfortunate Richard II. was conveyed through Highgate, in 1398, on his way from the North, by his haughty rival, Bolingbroke, hooted by the rabble. In 1461, Thomas Scrope, baron of the Exchequer, was beheaded by the insurgents in Highgate. In 1745 the London train-bands marched through Highgate to encamp on Finchley Common, to defend the metropolis against Prince Charles and the Scots. Mr. Howitt remarks that he has seen a man, then 112 years old, who, as a boy, witnessed the battles of Preston Pans and Culloden. On West Hill is the Fox and Crown Tavern. Sixteen days after our Queen came to the throne, she was descending the hill with her mother, the Duchess of Kent, when the horses took fright, and dashed down the hill. The landlord, Mr. Turner, succeeded in stopping them; and if he had not done so, there would probably have been a change in the succession to the throne. Turner was allowed to place the royal arms over his door, and received a handsome present.

Coleridge settled at Highgate, in the house of Mr. James Gillman, surgeon, about 1800. At an early period he had used opium, and could not shake off that unhappy bondage. His physical strength gave way, and his mind was unstrung. "Here," as Carlyle says, "he sate looking down on London and its smoke-tumult, like a sage escaped from the inanity of life's battle, attracting towards him the thoughts of innumerable brave souls still engaged there,—heavy-laden, high aspiring, and surely much-suffering man." During this time he continued his literary work, and was visited by many of the chief literary men of the day. He died July 25, 1834, aged 61.

Mr. Mac Dowell, the sculptor of the "Reading Girl," resides at Highgate. His sculptures of "Love Triumphant," and "Death of Virginia," executed for Mr. Wentworth Beaumont, place him in a high rank in the artistic world. His son is a young sculptor of promise. In the old coaching days, travellers for the north stopped at Highgate, and at whichever of the nineteen public-houses it might be, "out came the horns, fixed on a pole, and the passengers were sworn to eat no brown bread when they could get white, unless they liked it better, and not to kiss the maid when they could kiss the mistress, unless they liked her better;" and a lot of other nonsense. This probably relates to the old passage-toll levied on horned cattle, and gathered by some park-keeper, who carried a staff with horns to show his authority.

At Fitzroy Park, an outskirt of Highgate, Dr. Southwood Smith lived, a very modest and clever man of science. He was physician to the London Fever Hospital, and wrote a valuable "Treatise on Fever," and "Animal Physiology," for the Society for the Diffusion of Useful Knowledge. In 1837, he was appointed by Government to inquire into the state of the poor, and many sanitary reforms resulted from his investigations. Dr. Smith died at Florence in 1861, and was buried in the Protestant cemetery there.

Highgate has retained more of its rural character than any other village in the suburbs of London. It has its old buildings, elm and lime tree avenue, and around stretch fields and hills. The house and estate of Caen Wood are the finest feature of the immediate vicinity of the village. The house is large and massive, of yellow stone, and was erected in the style of the reign of George III.; Robert Adam was the architect, and he also built Luton House and Gosford House. The rooms in Caen Wood House are lofty and convenient. The park and grounds are so arranged, that one has all the sylvan exclusion of a remote country mansion. Walks, two miles in extent, conduct you round the park, which contains fine beeches and cedars of Lebanon. Mr. Howitt says a custom is kept up here which smacks of the old feudal times. Every morning, when the night watchman goes off duty, at six o'clock, he fires a gun, and immediately three long winds are given on a horn to call the servants, gardeners, and labourers to their employment. The horn is blown again at breakfast and dinner hours, and at six in the evening for their dimissal.

The confederates of Guy Fawkes fled into Caen Wood, on the failure of the Gunpowder Plot. The hill at some distance from it is still called Traitors'-hill, and here it is supposed they stood waiting for the explosion, to assure them that the plot was successful. William Paterson, the founder of the Bank of England, lived near here: he was a Scotchman, and very clever. He collected the springs of Caen Wood into reservoirs, and supplied Hampstead and Kentish Town, till the New River Company was established.

Caen Wood House (or Kenwood House, as it is now generally called), in 1661, was the property of a Mr. John Bill, who married a Lady Pelham, supposed to be the widow of Sir Thomas Pelham, and a daughter of Sir Henry Vane. It afterwards became the property of the Earl of Bute, who married the only daughter of the celebrated Lady Mary Wortley Montagu. The earl sold the estate in 1755 to Lord Mansfield, who, on his death, devised it to go with the title to his nephew, Lord Stormont, whose descendants now possess it. Mr. Howitt gives a capital sketch of the life of William Murray, fourth son of Viscount Stormont, afterwards Lord Mansfield. His father had fourteen children, and was very poor, so that they lived chiefly on oatmeal, porridge, and salmon. Willie was sent to the grammar-school of Perth. He rode on his pony from Scone to London, being then fourteen years of age, with a bag of oatmeal hung from its neck. He entered Westminster school, and gained a good deal of learning. He pleaded at the bar, and a silvery-toned voice won him many admirers. In 1742 he became Solicitor-general, and eventually Lord Chief Justice of the King's Bench, and Chancellor of the Exchequer, with the title of Earl of Mansfield. He first decided that no slave can remain a slave in England. He was, however, against the liberty of the press, and supported the practice of pressing seamen. Lord Campbell tells us he had no *heart*; all he did might have been done from a refined calculating selfishness, with a view to his own credit. He had no warmth of affection; he formed no friendships; and he neither made exertions nor submitted to sacrifices purely for the good of others. ("Lives of the Chief Justices," ii., 576).

Oliver Cromwell built Cromwell House, a solid red-brick mansion, about the year 1630; but he is thought never to have made more than an occasional visit to it. Prickett, in his "History of Highgate," says, "Cromwell's House was evidently built and internally ornamented in accordance with the taste of its military occupant. The staircase, which is of handsome proportions, is richly decorated with oaken carved figures, supposed to be of persons in the general's army, in their costume; and the balustrade filled in with devices emblematical of warfare. On the ceiling of the drawing-room are the arms of General Ireton: this and the other ceilings of

* "The Northern Heights of London; or, Historical Associations of Hampstead, Highgate, &c." By William Howitt. London: Longmans. 1869.

the principal apartments are enriched in conformity with the fashion of those days. The proportions of the noble rooms, as well as the brickwork in front, well deserve the notice and study of the antiquary and the architect." The figures here mentioned stand on the posts of the staircase.

Andrew Marvell, the patriot, had a house at Highgate. He was the son of a clergyman at Hull. He became secretary of Earl Carlisle and assistant Latin secretary, with Milton, to Cromwell; and in 1658 became Member of Parliament for Hull. He mercilessly exposed kings and bishops. Charles II. issued a proclamation offering a high reward for his apprehension; and he retired to Hull, where he died soon afterwards, in his fifty-eighth year. Marvell was the first to discern and proclaim the magnificent genius of "Paradise Lost."

Not far from Cromwell House once stood Arundel House, the suburban residence of the Earls of Arundel. Norden mentions it in his "Survey of Middlesex," in 1596. The King slept here in 1624. Two interesting historical events took place here,—the flight from it of Arabella Stuart, in the reign of James I., and the death of the Chancellor Bacon, about fifteen years afterwards. Arabella Stuart was descended from Henry VII. Had James I. had no children, she would have been the next heir to the English throne. Elizabeth put her in prison to prevent her marrying; and, of course, James was not more favourably disposed towards her. William Seymour, second son of Lord Beauchamp, eldest son of the Earl of Hertford, fell in love with Arabella, and they were secretly married. James was furious when he heard of it, and sent the husband to the Tower and the wife to Lambeth. He then ordered her to be sent to the Bishop of Durham, and was only prevented by a fever coming on during the journey, and was brought back to Highgate, to Arundel House. Here she planned an escape for herself and husband, who was in the Tower, and she succeeded in getting away disguised in men's clothes, and got on board a French boat, which was waiting for her. Seymour escaped from the Tower disguised as a physician, but the boat containing his wife had put to sea, and he engaged with a captain of a collier to carry him to Flanders. His escape was soon discovered, and Arabella was taken, but Seymour escaped. She was taken to the Tower, and soon went out of her mind, and died about four years afterwards. Her husband was permitted to return after his wife's death, became Marquis of Hertford, and fought for the Crown in the civil war, though he had married the sister of the Earl of Essex, the Parliamentary general, and Charles II. restored to him the title of the Duke of Somerset, which had been forfeited by his great-grandfather, the Protector.

In 1626 the man who revolutionised philosophy and laid the foundation of all our modern progress in science, died here. For five years he had been a fallen and disgraced man, banished from court, and living in retirement. We owe him our gratitude for his "Novum Organum," but he certainly took bribes as a judge, which does not give us a very high idea of his morality. He kept great state, and his ostentation of liberality was somewhat pitiful. On his trial he delivered in a list of bribes taken by him on twenty-eight cases, and these amounted to 10,660*l.*, equal to 60,000*l.* of our money. He got chilled when trying an experiment respecting preserving bodies in snow, and then slept in a damp bed, and died at Arundel House, in the sixty-sixth year of his age.

On descending the hill not far from the Archway Tavern, is a massive stone, bearing this inscription:—

"WHITTINGTON STONE.

SIR RICHARD WHITTINGTON, LORD MAYOR OF LONDON.

1397 ..... Richard II.
1409 ..... Henry IV.
1419 ..... Henry V."

This stone takes the place of one at which Sir Richard, when riding here, having dismounted and walked up the hill, mounted again. It is not our intention to venture to disprove the cat story, but, at any rate, Whittington was a great man in his day. In the reign of Edward III. he made the king a present of 10,000*l.*—a vast sum in those days—towards the expenses of the war with France. Stowe says that he dealt in wool, leather, and pearls. He entertained Henry V. and his queen at Guildhall; and the king having praised the fire made of choice woods and spices, said he would make it still more agreeable to his Majesty. He then threw into it the king's bonds for 10,000 marks due to the Mercers' Company, 12,500 to the Chamber of London, 12,000 to the Grocers; to the Staplers, Goldsmiths, Haberdashers, Vintners, Brewers, and Bakers, 3,000 marks each,—of course an immense sum. Whittington built a church in Vintry Ward, almshouses, and a college; rebuilt Newgate, repaired Guildhall, and did many other useful works.

Mr. David Williams, founder of the Literary Fund, and minister of the Presbyterian Chapel, lived at Highgate. He was born near Cardigan in 1738, and was educated at a college of Dissenters at Carmarthen. He became minister of a small congregation at Frome, in Somersetshire, but soon removed to a more important charge at Exeter. The elder members of his congregation objected to his entering into social pleasures, but, as he happened to know something of their own private character, they agreed that if he left Exeter he should take the office of pastor at Highgate. In 1770 he appeared as the defender of Mossop against Garrick, and wrote the actor a letter, which resulted in Mossop being liberated. Williams detested anything like intolerance or bigotry. He retired to Chelsea after a time, and during his residence there he gave an asylum to Dr. Franklin at a period when there was great excitement against him. Mr. Williams proposed a scheme for universal uniformity of worship, and delivered a set of lectures illustrating this principle in the chapel in Margaret-street, Cavendish-square. In 1782 he published a work called "Letters on Political Liberty," which was translated into French, and procured him an invitation to Paris to assist in drawing up a constitution for France, but his advice was not taken, and the Revolution followed.

J. P., Jun.

GREAT PRIZES FOR ART WORKMANSHIP.

THE Council of the Society of Arts having in view the International Exhibitions about to take place under the management of the Royal Commissioners for the Exhibition of 1851, think it well to suspend for a time the form hitherto adopted in offering prizes for art-workmanship, believing that the change is likely to be beneficial to the object the council have at heart, viz., to see the art-workmen of the United Kingdom occupying a good position in the coming International Exhibition in comparison with those of other countries.

With this view, the council have decided upon offering a series of rewards for special excellence on the part of all concurring in the satisfactory production of works of industry of the highest character. They consider that they can most effectually ensure their object by offering to manufacturers the highest distinctions they have it in their power to confer, and to workmen liberal money premiums. They desire to obtain, from those who may be willing to compete for the prizes they offer, specimens of art-manufacture, which will have to be sent to the Society's rooms by the 14th of January, 1871.

These will be immediately judged upon their merits, and the premiums enumerated below will be awarded. An endeavour will be made to effect arrangements by means of which every object receiving a premium, or selected for the distinction of being exhibited, will be placed in the coming International Exhibition as a contribution on the part of the Society of Arts, showing the results of recent efforts made to improve art-workmanship in this country.

The specimens of manufacture sent in, in competition for the above rewards and premiums, will have affixed to them the name of the designer and of the workmen, in each special branch of industry involved in the execution of the work. Every workman will be eligible to receive money premiums proportionate to his merits, and to the degree in which he may have contributed to the successful results of the whole; while the manufacturer may receive the gold or silver medals of the Society.

The Society hope that they may receive objects enabling the judges to award the Society's gold medal to manufacturers; and the Society's silver medal to manufacturers or designers—accompanied in the latter case, if the circumstances appear to call for it, with money premiums; and to the art-workmen, money premiums from 3*l.* to 20*l.*, and to the extent in the whole of 500*l.*

These works may obviously include specimens not only of the taste of the designer, but of the skill of the carver, inlayer, metal-worker, chaser, bronzist, engraver, china-painter, die-sinker, cameo-cutter, glass-worker, enameller, mosaicist, and other art-workmen, either separately or in any arranged combination.

It is thought better not to define too closely the objects of manufacture likely to result from any such combination; but, by way of illustration of what the Society hopes to receive, may be mentioned the following:—

A cabinet with glazed doors, for the exhibition of articles of *certu* of the highest character.
A toilet-glass suited for the boudoir of a lady of rank.
Any combination of goldsmiths' and silversmiths' work, with elaborate glass fittings, for the centre of a dining-table.
A chamber-organ, piano, or other musical instrument, combining enamels, inlays, marquetrie, and metal work.
A circlet or other personal jewel, executed with enamels, chasing, &c.
A case for a Bible, presentation volume, or any rare book, involving carving, inlaying, marquetrie, and precious metal work.

No object involving combined labour for its production will be eligible for reward, unless accompanied with the names of all those engaged in its production, to the most meritorious of whom—whether their works may be exhibited in the rooms of the Society, or in the International Exhibition—every effort will be made by the Council to give publicity, and attract attention.

Such combinations between the manufacturer, designer, and various workmen, will not preclude the award of premiums to individual workmen producing any object single-handed.

By way of illustration of the class of objects likely to be so produced, and to be highly regarded by the Society, the following may be mentioned:—

A drinking-cup.
A centre-piece for flowers in blown or twisted glass, decorated with filigreei, or enamel colours, or by combination with metal-work.
A candelabrum in wrought iron, brass, bronze, or other metal, with inlays, enamelling, damascening, &c.
A flower-box in modelled and painted china or earthenware.
A carved or modelled clock-case.
A carved or modelled chimney-piece.

The Council will far more highly esteem grandeur and beauty of style, invention, or elegant simplicity, than they will richness or minute elaboration.

We earnestly commend these proposals alike to manufacturers, designers, and workmen.

KENWOOD TOWER, HIGHGATE.

KENWOOD TOWER, now being erected for Mr. Edward Brooke, will have the external walls faced with Loughborough red bricks and rubbed Reading red brick quoins, all the dressings of the windows and other stonework being of Doulton freestone. The chimney-shafts will be of various patterns, and built up in small moulded bricks, supplied by Gamlin, of Cassy. The roofs are to be covered with ornamental red and dark grey tiles. The dining-room will have a moulded and carved ceiling in wainscot; also dado doors and window jambs, all of wainscot framing, moulded on the solid. The floor parquetry; the chimneypiece will be modelled and carved, with various woods and marbles: it will be the whole height of the room, and worked into the cove of the ceiling. The principal staircase is to be of wainscot, carved, of Elizabethan design, with an open-timbered ornamental roof, coloured. The billiard-room, ante-hall, and principal hall will be fitted up with pitch pine, of similar design to the dining-room. The upper portion of the windows in the ground-floor rooms is to be filled with stained glass, supplied by Heaton, Butler, & Bayne, the subjects to be suitable to each room. There will be a stained-glass window, too, on the principal staircase, filled in with the armorial bearings of the Brooke family; in the hall, large stained windows, with subjects from well-known fables. Polished marble columns and carved capitals are used inside, both in staircase, hall, and drawing-room. The conservatory and vineries will have an entrance from the dining-room.

Mr. E. M. Ward's picture, "Judge Jeffreys," and Mr. Frith's portrait of Mrs. Rousby, both in the present Royal Academy Exhibition, will hang in the dining-room here.

The contract is taken by Messrs. Jackson & Shaw for 10,126*l.*, exclusive of the conservatories, chimneypieces, and stones. The foundations have been put in by Messrs. Sharpington & Cole, who have also erected various decorative structures in various parts of the grounds. The clerk of works is Mr. G. Simonds. The whole of the works are being carried out from the designs and under the superintendence of Messrs. E. Salomons & J. P. Jones, architects.

KENWOOD TOWER, HIGHGATE.—PLAN OF GROUND FLOOR.

KENWOOD TOWER, HIGHGATE.—MESSRS. SALOMONS & JONES, ARCHITECTS.

RICHMOND, SURREY.

A COMMODIOUS chapel for the Baptist Congregation has just been completed and opened in Richmond. The building stands on a prominent freehold site near the railway station, and is constructed of corrugated iron, resting on a base of brickwork about 6 ft. above the ground level. It is approached in front by a flight of Portland steps, through an open deal porch, over which is a circular stained glass window. The pewing is also in deal. The pulpit and reading-desk are of oak, on a raised platform, at the rear of which is the open baptistery, with a vestry on each side. The size of the main building is about 80 ft. by 50 ft., and accommodates 700 persons. The height from level of floor or top of brickwork to the apex is 35 ft., with a bell-turret in the south-east corner 60 ft. high. The roof is boarded diagonally, and secured by perforated T-iron principals supported on iron columns, which divide the space into nave and aisles. It is lighted, artificially, by three crown pendants. The ironwork throughout has been painted with Calley's Torbary iron paint, which is said not to be liable to be affected by the action of the weather. The contract was taken by Mr. Giles Bennett. Total cost, 1,700*l*. The work has been carried out under the personal superintendence of Mr. Albert Bridgman, architect. Sufficient space has also been secured for Sunday and day schools, which will shortly be erected.

AN ARCHITECT'S ACCOUNT OF THE GIANT'S CAUSEWAY.

THE curious and wonderful assemblage of basaltic pillars on the coast of the county of Antrim, Ireland, known as the "Giant's Causeway," has been a thousand times described by artist, essayist, journalist, traveller, and poet. It has been a meet subject for the whole artistic and literary phalanx of Europe and America. Topographers have rounded it, geologists hammered it, painters limned it, poets apostrophised it, and Vandal excursionists bid fair, if not stopped for the next generation, to trample it down to the sea level, or pick it to pieces, to satisfy an uncontrollable and unwholesome passion of carrying home "a bit of the Giant's Causeway" to ornament their chimney-boards. Amongst all the sightseers who visited the Causeway, we have never known but one architect who visited it that described it. As this architect's account has not met the eyes of many, and as it is to our thinking one of the most interesting descriptions that have been given, we will present it to the readers of the *Builder*. Though written many years ago, it has lost nothing of its interest. The writer was an architect of eminence in the sister kingdom, who held during his lifetime a conspicuous place in his profession, and lived to find a successful rival in the person of his own son. R. Morrison, architect, for he was the writer, enjoyed good practice in Ireland. One of the name in the sister island has impressed his character, as our readers know, upon his works.

Our architect thus describes the Giant's Causeway:—"The sea cliffs contiguous to the Causeway are particularly high. You approach it by a narrow path, or a long dreary precipice almost impassable. Every image which presents itself has something uncommonly grand and magnificent. Above you, the impending rocks to a timorous fancy threaten instant ruin; around you the sea presents immensity, unless where the shore of Scotland gives the idea of a world set at a proper distance for contemplation; and below you, the dreadful precipice produces an effect of inexpressible solemnity.

The Causeway is a low head, extending from the head of the cliffs into the sea like a mole, consisting of a great number of polygonal cylinders or pillars, so closely united that the edge of a knife cannot be inserted between their adjacent side. At the first view this head did not appear to me so grand as I expected from the drawings I had seen of it; but when I came to walk on it, and to consider its plan and situation more attentively, it appeared a stupendous production of nature, extending from the bottom of the cliffs into the sea, but to what distance has never been ascertained. At low water the length of it appears to be 600 ft.; its breadth, in one place, 240 ft., in the narrowest, 120 ft.; it is very unequal likewise in its height. In some places it is 36 ft. high from the level of the strand, and only 15 ft. in other places. The pillars of which the causeway is formed stand most of them perpendicular to the plane of the horizon, yet the contexture of them is so adapted that there is no vacuity between them. I could not discern whether they run underground like a quarry or not. Some of them are very long, others short, and some for a large space are broken off an equal height, so that their tops make an even plane surface. Many of them are imperfect, crooked, and irregular; others entire, uniform, and handsome, and these of different shapes and sizes.

I found them almost pentagonal or hexagonal, a few excepted, of seven sides, and many more pentagons than hexagons, but they were all irregular, for none that I could observe had their sides of equal breadth. These pillars are some of them 15 in. and some 18 in., and some of them 2 ft. diameter. None of them are one entire stone, but every pillar consists of several joints or pieces, as I may call them, and the whole are jointed as close as it is possible for one stone to lie upon another, not jointing with plain flat surfaces. The upper ends of most of the pieces are concave, the lower ends convex, the prominences of which are nearly quarters of spheres, with rims round them. The length of each of these pieces which compose the pillars is 6 in., some 12 in., 18 in., and 2 ft., and easily separated, though so united in all appearance. When I parted them asunder, both the concave and convex superficies appeared very smooth, as are also the sides of the pillars which touch one another, being of a whitish freestone colour, but a much finer and closer grit. When I broke some pieces of them, the inside appeared like blackish iron grey, somewhat like the best limestone marble before it is polished, but of an extraordinary hard, close, and compact texture; their grit or grain so very even and fine that it hardly appears, but, where the stone is nearly broken, there it shows itself on its surface like a very minute, small glistening sand, thickly interspersed with the rest of the solid, and this (by reason of its parts being so closely combined together) has more specific gravity than most other kinds of stone. I must observe that, in my opinion, the curiosity of this place is much increased by the stones of which the pillars are composed being the irregular rather than the regular figures of geometry, as it is much more difficult to suit the sides of polygons together than squares and triangles, the latter being done easily by putting together two triangles equal to the square. I perceive in some of the stones the scheme of the 11th, 12th, 13th, 14th, and 15th propositions of the Fourth Book of Euclid, wherein an ordinate pentagon was inscribed; about it was circumscribed a circle: in another I observed a cylinder circumscribed about a cone. There is nothing more surprising than the piles of rocks here composed of a vast number of polygons; the external angles of each exactly suiting that made by the adjacent figures, and some rising like a flight of stairs to a considerable height.

At a small distance from the Causeway you discover in the impending cliff to the south-east, one large pile of those polygonal figures, so situated and united as to appear really to be what it is commonly called the Giant's Loome or Organ, as in perspective it resembles either. Another on the summit of the precipice has so much the resemblance of the chimneys of a house that the *Laia*, some ship of the Invincible Armada, mistaking it for a town, in the approach to it split on the rocks.

From observing at low water the rocks stretching a great length into the sea, and that there are similar ones on the opposite coast of Scotland, some have been led absurdly to imagine that there was formerly a design of uniting the kingdom by means of this Causeway!—a notion pregnant with folly. Others, from observing rocks in the precipice or cliff similar to those of the Causeway, have imagined that the sea, by undermining, has brought down these; but there is really no foundation for the remark, there not being any great similarity between the stone in the Causeway and precipice; and the pavement of the Causeway extends along the shore, where it could not have fallen from the precipice; nor can we, with any degree of reason, attribute to a chance fall a phenomenon so regular, so perfectly connected, and so extensive. Others, again, with a superior display of penetration, endeavour to account for the figures of the stone from the crystallisation of salts. This they found, I suppose, on the doctrine of l'Abbé Nollet, who, in his lectures on experimental philosophy, says that 'every salt when crystallised generally affects a figure which is proper to itself, and which probably depends on the figures belonging to its smallest part. Sea salt, for example, forms amber, saltpetre needles, sugar globules,' &c.

For my own part, I think it most reasonable to imagine that nature, which pursues infinite diversity of plans, forming some things for the use, others for the pleasure, of mankind, has left this and such like curiosities as perpetual subjects for our admiration, that, from observing the wonders of the visible creation, we might be led to sublime contemplation of the invisible Creator, and, as Democritus philosophised amongst the rocks of Abdera, were a man of reflection to confine his whole observation to this Causeway, and attentively to consider it, he would find himself surrounded by pregnant proofs of the divine wisdom and power. Indeed, all the works of human art must cease to attract if compared with this. Not the army of Xerxes, with an Archimedes to direct them, could form anything so wonderfully great, so uniformly various.

The usual attempts to explain this phenomenon appear to me very absurd. It had its name from the ignorant credulity of the unlettered, and superstitious vulgar causes, often of more absurd errors."

So ends the description given by an architect of a visit to the Giant's Causeway.

ON LIGHTNING RODS.

IN a lecture printed in the American *Gaslight Journal*, an attempt is made by Dr. Bushee, of Worcester, Mass., to show that lightning-rods constructed and erected according to the principles in vogue, tend at least as often as otherwise (the author says, oftener), to increase the danger.

The lecturer said, while observing effects of atmospheric electricity with reference to the construction of the lightning rod, my attention was called to the fact that a large majority of buildings struck by lightning had rods. Sometimes houses with rods were severely damaged, while others, in close proximity, without rods, escaped. In some instances buildings have stood half a century uninjured, but immediately after the application of rods, were struck by lightning. Such facts have done much to destroy confidence in rods, while on the other hand they call on us to answer to the question,—Are lightning-rods a total failure? If not, what are their defects, causing so many accidents? My decided convictions prompt the answer: they are not a failure in principle, but have become so to a great extent by defective application.

Passing over points of minor importance, the leading defects of rods in general, and the chief cause of disaster, appear to be due to imperfect connexion with the ground. The rod is usually run into the ground from 4 ft. to 6 ft., or until it is supposed to reach moist earth. This is a great mistake.

It is well known that clay, sand, and gravel are comparatively poor conductors, and the very limited surface which a common rod presents to them affords very inadequate means of relieving the rod.

In such cases the tip of the rod is often burned or fused, the glass insulators (if such are used), broken and thrown from their places, and frequently the ground where the rod enters more or less torn up.

When the rod is subjected to all the pressure it can bear, some slight causes often turn the balance of forces in favour of a lateral discharge; and this is often ascribed to the insufficient size of the rod, or to the form, or material, or mode of insulation, while the main cause of the failure of rods to perform their proper functions appears to be due, in nine cases out of ten, to an overcharge of the rod caused by the resistance of the earth.

In Worcester county over eighty cases have been reported in the use of a patent copper rod, in which evidence was left that the rod had been too severely charged. In a large majority the electricity leaves the rod at or very near the earth. Often the effect is shown merely in tearing up the ground. Moreover, in the most severe cases I have observed, the rod is invariably found imperfectly connected with the ground; usually much oxidated, and sometimes extending not more than 2 ft. or 3 ft. into the earth.

Dr. Bushee's recommendation (by no means a new one) is, that in all cases the rod should be connected with the water-pipes and gas-pipes with which our large towns and cities are furnished; which, being good conductors and pre-

senting large surface, promptly diffuse the heaviest charge to the earth. Such pipes have, nevertheless, been struck by lightning and the joints destroyed, and persons have been injured by electricity from gas-burners, but when a proper connexion is made with a good pointed rod, and hence the charge *gradually* received, no possible harm can occur.

He also recommends another mode which is not uncommon; that is, connexion with a well, spring, or permanent stream, this being in general a safe and reliable means. The rod should extend to some considerable depth into the water.

It is thought by some, he said, that metallic roofs possess some power of protecting buildings from lightning, but experience shows that buildings with such roofing are sometimes struck, and probably as often as other buildings under similar circumstances, and therefore require the same means of protection. Good points should be attached to the chimneys or highest part of the house, and connected with the metallic roofing. It is not necessary for the rods to be extended over the roof, and they may run simply from the eaves or lower edge of the roof to the earth.

HOW IS THE DEATH-RATE KEPT UP?

SIR,—The *Builder* is full of lamentations on the subject of defective sanitary arrangements, polluted rivers, and such-like sanitary abominations, and look at the result of this state of things. It appears the weekly returns of the Registrar-General for the future are to include several large towns not hitherto inserted in that official report, and on examining statistically the effect of past sanitary arrangements, I drew the following deductions therefrom. If we are to judge of the health of towns by the death-rate, it is clear very little progress, if any, has been made in effective sanitary improvements, and I think her Majesty will have to appoint another Commission to examine into the cause, as in 1844: although it is rather early for the moral effect of the last searching inquiry to be lost already, and for history to repeat itself so soon:—

	Estimated population. 1869.	For Ten years. 1851 to 1860.	Health of Towns Report. 1840, -41, and -42.
	Per 1,000.	Per 1,000.	Per 1,000.
Hull	25·37	24·1	30
Bradford	25·53	26·6	24
Liverpool	29·00	30·0	35
Sheffield	27·58	27·0	27
Birmingham	21·51	24·9	27
*Leeds	26·25	26·3	27
Newcastle-on-Tyne	26·10	27·4	27
Bristol	24·22	23·2	31
Manchester	28·97	29·4	32
*Salford	26·75	26·2	28

Thus it appears in the above list there is a slight increase in the death-rate of two towns (marked *) from 1840 to 1869, and in the other towns there is little, if any, change; so our labours for the last thirty years have produced very little effect. The new year has opened more disastrously. It is very self-evident, and well understood, that sanitary works, if efficiently and properly carried out, do materially reduce the death-rate, as we have many towns that are cases in point; but it appears from some inexplicable causes our large towns do not profit by them to that extent that we ought to expect, and I think the excess of deaths should not be attributed to but should be quite irrespective of, the increase of population.

I am one of those sanguine enough to believe that it is possible, with proper sanitary works, and sanitary measures strictly enforced in towns, to reduce the death-rate to a minimum,—say not exceeding 2 per cent. of the population, and it is therefore perfectly clear that our provincial town authorities have now had more than a quarter of a century's fair and indulgent trial, and they have proved themselves wanting. The action of the Royal Commission now sitting might very well be directed to this important subject, so as to stimulate our slumbering town authorities as a temporary measure; and for a permanent improvement a Minister of Public Health should be at once appointed, with a skilful and energetic staff, who would frequently and periodically survey our dirty towns and the plague spots in them, and thus by these means remove the foul blot that now defaces our national escutcheon.

B. B.

St. Mary's, Exeter.—It is proposed to add a tower to St. Mary's Church, as a memorial of the late Bishop.

CHURCH-BUILDING NEWS.

Goudhurst.—The old church of this parish has, for some time past, been undergoing internal restoration, which will soon be finished. The proprietors of Bedgbury and Combwell, Mr. A. J. B. Beresford Hope and Mr. H. J. Campion, are restoring the south chantry, at an expense of some 400*l*, and there only remain the south aisle, as wide as the nave, and the north chapel, to complete the internal restoration. The church was filled with the highest of pews, and had the usual western gallery with small organ. Nearly all these have been removed. All the windows except one had been despoiled of their mullions and tracery. Three of these have been restored at the expense of Mr. R. Oakden, and three others by Mrs. Cramer Roberts, Mrs. S. W. Newington, and Miss Miller. A new pulpit, of oak, on a stone base, carved by Forsyth, was the gift of the late Mrs. Henry Lake, of Highgate. The restoration of the north aisle has cost about 1,000*l*. The chancel has been restored by the Ecclesiastical Commissioners, two entirely new windows being inserted in the east and north walls. The east window is of coloured glass, executed by Messrs. Clayton & Bell. It consists of three lights and represents the subject of the "Crucifixion," treated triplet-wise. In the northern light are the "Three Marys standing by the Cross;" and in the southern light, "Joseph of Arimathea, Nicodemus, and the Centurion." The north window represents the "Supper at Bethany."

Loppington.—The re-opening of Loppington Church, near Wem, after its thorough restoration, has been celebrated. The greater portion of the edifice has been rebuilt, with the exception of the tower, the circular arches of which point to its Norman origin. It is a stone building, with freestone facings; and the high pews have been replaced by low-backed seats. It is also fitted up with a heating apparatus. The work has been carried out by Messrs. Bowdler & Darlington, Shrewsbury, from plans by Mr. E. Randall, of the same place. The work of restoration required the sum of 1,600*l*., which has been raised, or nearly so, by public subscription. The restoration of the chancel has been done by Mr. Vaughan and Captain Dicken, at a cost of 300*l*.

Wombridge.—The parish church here has been re-opened for divine service, after rebuilding, except a portion of the tower, which has been refaced. The new church is built on the old foundations, with the exception of the chancel, which has been extended. The church is cruciform in plan, and provides sitting accommodation for 350 persons. The walls are faced with Cefn stone, and the dressings are of the same material. The cost has been 2,000*l*., and the work has been carried out by Messrs. Millington & Son, of Oakengates, builders, from the design of Mr. George Bidlake, of Wolverhampton, architect. The whole of the windows, except one, are filled with rolled cathedral-leaded quarry-glass, of a light warm tint, with a margin of a greenish hue, by Messrs. Done & Davies, of Shrewsbury, who have also filled the other window with stained glass. The subjects in the last window were specially chosen by the vicar, on account of the late Mr. Oliver's kindness to children, it being to the memory of that gentleman that the window has been erected. The subjects which the memorial window contains are, "Christ with the Doctors in the Temple," and "Our Saviour blessing little Children," with a canopy over each. Underneath the subjects is a base, which also forms a small canopy for the lily which is introduced at the bottom of the window. The church will be warmed by an apparatus supplied by Mr. Dodwell, plumber, Shrewsbury. In excavating for a road around the church, the workmen met with some walling belonging to the original fabric. It was 2 yards thick, and appears to be of the date of 1216.

Wantage.—West Hanney Church, after restoration, has been formally re-opened by the Bishop of Oxford. Mr. Jas. Brooks, of London, provided the plans. The total estimate was 1,700*l*., in which was included the porch over the principal entrance on the north side, where there is a Norman arch, and also the chancel. Sufficient funds not having been raised, the vicar was compelled to limit the work to about 1,100*l*. The church is fitted with stained deal seats, all unappropriated, and will seat 300 persons. Under the seats the floor is boarded, and the aisles are laid with Staffordshire tiles. An open-timbered roof, stained, covers the nave. The plans have been carried out by Messrs. Longmire & Burge, of London.

Radwinter.—The parish church of Radwinter has been re-consecrated, under its former dedication to St. Mary the Virgin, after having undergone a restoration in every part except the tower. The church has been enlarged by adding one bay to the nave, and therefore the chancel has been thrown forward. The architect was Mr. W. Nesfield. The old square pews are replaced by plain deal benches. The chancel is elevated three steps above the nave, and is paved with tiles. The chancel stalls are of carved oak.

Elmsted Market.—At a meeting of the building committee appointed to carry out the erection of a new church at Elmsted Market, the plans of Messrs. James Stannard & Co., of Leicester, were submitted for inspection, and accepted, the estimated cost of the church being something over 2,000*l*.

Barnsley.—The restoration of St. Mary's Church has been commenced. The designs for the alterations are furnished by Mr. Bodley, of London, architect; and the work, which is of an extensive character, including the entire remodelling of the interior of the church, and the opening out of the west window, which is to be filled with stained glass, in memory of the late Mr. J. S. Beckett, will occupy some time.

Kidderminster.—We hear that a new church is to be erected at Franche. Plans for a small structure have been prepared by Messrs. Martin & Chamberlain, of Birmingham, and the contract for the building has been taken by Mr. Thompson, of Park-lane.

Nether Denton.—The new church at Nether Denton has been consecrated by the Bishop of Carlisle. This church has been erected to supply the place of an old structure dedicated to St. Cuthbert. The new building is in the Early English style of the thirteenth century, and is calculated to accommodate 140 persons. It consists of a nave 45 ft. 6 in. in length, and 21 ft. broad; and a chancel, 26 ft. 3 in. by 17 ft. 6 in., on the north side of which is an arch containing a harmonium, separated from the vestry by an oak traceried screen supporting a grille of ironwork glazed. The entrance is by a covered porch on the south side. The chancel is lighted by a triple lancet window, filled with stained glass, by Messrs. Gibbs, of London, representing the Crucifixion and other Scriptural incidents. The tracery is plain and undecorated. The south and north sides are perforated with a continuous arcade of single lancet windows, one or two of which are filled with stained glass. The west end is lighted by two large lancet windows. The walls are double, with a space between them, the inner part being of chiselled and square stonework, without plaster, by which means the church will always be dry; and the exterior of the church being of white stone, of a description which abounds in the neighbourhood, and contrasting with the red sandstone from Wetheral, of which, in lieu of slates, the roof is composed. There is a double bell column at the west end of the edifice. Messrs. Cory & Ferguson were the architects, and under their superintendence the building was erected. Mr. W. Armstrong, of Gilsland, contracted for the masonry; Mr. Court, of Carlisle, supplied the woodwork; Mr. Norman, of Carlisle, contracted for the roofing; Mr. Thompson, of Carlisle, for the plumbing; and Mr. Bell, of Wigton, for the painting and glazing. The cost of the church was about 1,000*l*., part of which is not yet subscribed.

Bestwood Park.—A new church has been erected here, and opened for divine service, according to the *Notts Guardian*. The church is built of stone. It will afford accommodation for nearly 200. The edifice is without aisles, and consists simply of an entrance up the centre, with seats on each side. The chancel is an apsidal one, and on the north side this part of the building opens, by means of a couple of small arches, into a vestry and organ (or rather harmonium) aisle. The windows are small, but numerous and deeply recessed. The porch is a feature in the building. The west end of the church is surmounted by a bell, hung in an open turret. There is a coloured window over the communion altar, and in the arrangements for this part of the church, the Duchess of St. Alban's worked the communion cloth. The seats consist of low chairs. The Duke of St. Alban's has aided in the cost of the edifice, and at the opening. The Duchess played the harmonium and started the singing.

Kettering.—The new church of St. Andrew the Apostle, at Kettering, has been consecrated by the bishop of the diocese The church, which is

built at the north end of the town, is of the Early English character, and is capable of accommodating 550 persons. It consists of a nave, south aisle, vestry, and chancel, and has been built at a cost of about 5,000*l.*, by Messrs. Barlow & Butlin, of Rothwell, from the designs and under the superintendence of Mr. Street, of London, architect. Mr. Godfrey was clerk of the works. The roofs, both of the chancel and of the nave, are high-pitched, and the pavement is of encaustic tiles. There is a small bell turret, with spire. Chairs are used in the church, to be replaced as soon as means are obtained by open seats. The lectern is of brass, and the altar cloth is of maroon-coloured velvet. The frontal was worked by Mrs. W. Lindsay, sister-in-law of the rector, and the super-frontal by other ladies. Previous to the service, a crozier was presented to the Bishop. The crozier was designed by the Rev. F. H. Sutton, vicar of Theddingworth, and executed by Messrs. Skidmore & Co., of Coventry. It is in the style of the middle of the fourteenth century; the staff is of ebony, with ivory bosses, and the head is ivory and silver-gilt, jewelled with carbuncles, topaz, and lapis-lazuli. It is the gift of certain laymen in the Archdeaconries of Northampton and Leicester.

Walworth Common.—The foundation-stone of a church, to be called St. Stephen's, Walworth-common, has been laid. The temporary iron structure at present in use is too small. The site of the church is in Villa-street, between Albany-road and Westmoreland-road. The architects are Messrs. Jarvis & Son.

Middle Claydon.—The church here, having been restored, has been re-opened by the Bishop of Oxford. Care has been taken, where practicable, to maintain the original fabric intact. The exterior has been restored, Dalton stone being used in the repairs. The tower and the chancel are of the perpendicular style of architecture, the latter having been built in 1519, by the Giffard family. The tower has three bells, which have been rearranged, new-framed, and re-hung. In restoring the porch, the old oak front has been stained and made the main feature, the new parts being in keeping. A new vestry and lobby have been built on the south side of the chancel, like the tower and chancel, in the Perpendicular style. In the interior, the old gallery has been taken down, and also the ringing-floor, a new one having been put up over the western arch. The old roof of the nave has been taken down, and a new oak panel one has taken its place, one beam being left to show the reproduction of the ancient work. The seats, the lectern, and the prayer-desk are all new, and are of oak. The old pulpit (also of oak), having been re-adapted, and fitted with new base, stairs, &c., has been retained. In the sill of a window in the nave a piscina was found, and has been repaired. The carved oak screen has been restored. In the chancel, the wagon-headed oak roof is embellished with red and gold devices, and the bosses are gilt; Messrs. Clayton & Bell, London, being the decorators. The communion-steps are of superior Devonshire marble, and the remainder of the church is paved with encaustic tiles, by Mr. Godwin, of Hereford. The alabaster monument of the Giffard family has been taken from the mural position it formerly occupied, and placed in the chancel. The monument by Chantrey of the late Sir Harry Calvert, Adjutant-General of the Forces, has been restored and decorated, as have also all the other monuments. The reredos, occupying the whole of the stand of the chancel, is of alabaster, executed by Messrs. Farmer & Brindley, of London. The centre portion is divided into three subjects—the middle one being the Ascension, that on the left the Resurrection, and that on the right the Day of Pentecost, carved in alabaster, and surrounded by carved canopies. The total cost of the restoration will be very nearly 3,000*l.*, the chief portion of which will be borne by Mr. Frederick Calvert and Lady Lucy Calvert. A short time since the inhabitants of Steeple Claydon were indebted to this same source for the spire of their church. The work has been superintended by Mr. G. Hannaford, under the directions and from the designs of Mr. George Gilbert Scott. The builders were Messrs. Franklin, of Deddington.

Fryerning.—St. Mary's Church, Fryerning, has been re-opened, after having been closed about twelve months for restoration and repairs. The works have been carried out by Messrs. Brown & Son, under the direction of Mr. Chancellor, of Chelmsford, architect. Judging from the extreme plainness of the stonework of the north and south doorways of the nave, and of the nave windows, the walls of the nave and chancel of this church are believed to be Norman work, probably of a very early date. The walls are constructed principally of the conglomerate, commonly known as "plum pudding stone," mixed with the thin Roman bricks, septaria, and large pebbles. Very little (if any) alteration appears to have been made in the walls, which are very substantial, beyond the insertion in both nave and chancel of windows of a later period. The wall at the west end of the nave appears to have been cut away, and a brick archway formed, opening into a fine specimen of a brick tower, erected very late in the fifteenth century. Previous to the present restorations the roofs of both nave and chancel were comparatively of a modern date, with the exception of two massively-constructed principals at the west end of the nave, which were, no doubt, the remains of an original roof, and which evidently supported one of the ordinary wooden steeples of the county, thus proving that the present brick tower, when erected, was altogether an addition to the church, and not built upon the site of a more ancient tower. The restorations that have been carried out include the stripping off the plastering from the outside walls all round (thus exposing again to view the old conglomerate walls of the Norman period), the restoration of the stonework of the Norman and other windows and doors, and the construction of entirely new open roofs of oak timber, tiled. Internally the chancel arch has been rebuilt in stone, the west gallery removed, and the brick archway of the tower opened up, the whole of the old pews and sittings taken out and replaced with oak benches of simple design, with oak pulpit, reading desk, and lectern, in character with the benches, the gangways being paved with tiles. In order to preserve the church from damp the surface all round has been sunk below the level of the floor and paved, and the church itself is heated by hot water. The organ has been rebuilt, and removed from the west gallery to the north side of the nave, at the west end, by Mr. Rust, of Chelmsford. The total cost of these restorations amounts to about 1,400*l.*

WEEKS'S DUPLEX BOILER.

THE upright tubular boiler which has been patented by Messrs. Weeks & Co. appears to possess considerable merit. It is so arranged that it is impossible for the whole boiler to fail, as, being made in two halves, the contraction and expansion are entirely neutralised; and should any unforeseen accident occur to one half, that portion can be detached and removed without in any way interfering with the working of the other half. The shutting off of either half of the boiler is accomplished by means of gun-metal valves and chambers. The arrangements for removal of sediment seem so simple that any ordinary labourer may clean out the boiler at any time without withdrawing the water from the apparatus or removing a single brick in the furnace. The patentees claim that the boilers being made of cast iron, their durability is far greater than those made of wrought iron, and they show their own confidence in their durability by insuring them for fifteen years.

SEWAGE IRRIGATION AT ABERDEEN.

AN experiment in sewage irrigation, the first, probably, so far north, is being made on land belonging to Lieut.-Col. Henry Knight Erskine, of Pittodrie, on his Spittal lands, a little to the north of the city of Aberdeen, between King-street-road and the sea. An agreement was entered into between the Commissioners and Colonel Erskine on the footing of the sewage being sold to him at the rate of 5*l.* per acre to the extent of the land cultivated, he being restricted to a maximum of 5,000 tons per acre per annum. The price of the sewage is thus about a farthing per ton. The whole extent of the land intended to be irrigated ultimately is from fifty to sixty acres, and the sewage is leased for nineteen years. The land lies immediately inland from the Old Town Links, is of fair quality, and has been under ordinary cultivation. The ground in great part has a pretty uniform slope, the primary requirement for sewage irrigation. The whole supply is diverted, when not required, down the main sewers to the ordinary outlet at the harbour. The catch-water drains run off the water to the main spill-water channel, which takes the exhausted sewage away into a burn in the neighbourhood of the Links, and thence into the river Don. The cost of two sewers and tank was about 550*l.*, which will be defrayed partly by Colonel Erskine and partly by the Police Board. The land was prepared in February last. The system of supply and distribution has been found to work well, the sewage flowing easily and uniformly over the land. The exhausted sewage is remarkably clear, while there is no perceptible smell from the operations. These are carried on upon the same principle as at Edinburgh, Barking, Croydon, and other places. The engineering works have been planned and superintended by Mr. R. Anderson, C.E., the Police Board's surveyor. The Lord Provost of Aberdeen has lately visited Hastings, to examine the A B C process of utilising sewage; and the Police Commissioners have put into the hands of Professor Brazier the matter of an analysis of the liquid used in this process, with the view of testing it in connexion with Aberdeen sewage.

THE INSTITUTE OF ARCHITECTS AND THE 1871 EXHIBITION.

No disposition being shown, although certain fresh commissioners have been nominated, to place the president of this Institute, *ex officio*, in the same position as the presidents of other like scientific and artistic bodies, the Hon. Secretary states that the Institute, representing the profession of architecture, feel themselves precluded, on account of this marked omission, from taking part, as a body, in the International Exhibition of 1871.

IS DISTORTION IN ARCHITECTURE THE STYLE OF THE PERIOD?

MANY modern instances of wryness in design seem to show an effort to repudiate the adage of the days of Ben Jonson, which says "By line and rule lives many a fool." If there is any wisdom in adopting a tag-rag style by reproducing broken outline and unfinished or decayed design, we are wise in our generation. Is it the freedom of Freemasonry, or for moonshine effect, that would-be baronial villas, and even streets, have so many nondescript towers and turrets so helplessly copied in detail, and stuck to, with tumble-down effect, as if some after-thought or blunder, which puzzles us now to make out what the taste and style of the period is? So future antiquaries may well say (from Marmion):

> "The towers in different ages rose;
> Their various architecture shows
> The builders' various hands."

Since Scott built his "romance in stone and lime at Abbotsford, my conscience!" what a host there has been of retrogressive imitators of the romantic in building, often without much regard to present fitness; such as the reproduction in costly stone of the toppling lath and plaster features of old Edinburgh, now excluding dwellers there from plain substantial houses so much required by workmen, and also, by way of contrast, to the broken outline of the ridgy back, piled deep and high, of the old town.

The old times have left much that is good to imitate: why should the beauty and taste of Mediæval design be generally so poorly grasped at in modern church-building?

Although the vast proportions of the perfect cathedral church may not be required, perfect, true, and harmonious construction should adorn all churches and chapels dedicated to the worship of an all-perfect Creator. Ancient Pagan temples and idol shrines had true and beautiful proportions, as also had the finished Christian places of worship of the Dark Ages. Why, in these enlightened times, perpetrate such distortion in erecting so many lop-sided churches, with "the taper spire that points to heaven," put up as chance or whim may dictate? Many churches built to please the priest, remind one of the hunchback who, after hearing a friar preaching on God's works being all perfect, asked what could be said of him? "Why," said the friar, "you are a perfect hunchback."

Surely imperfect copies of the fervent art of the builders in past ages need not be set up all over the land in hotch-potch style, as without being able to read sermons in stone we but play the fool's part, in pursuit of mere empty shadow, following the Jack-o'-Lantern of an absurd taste for retrogressive imitations in detail, without the true spirit of the old builders, "whose works have not followed them."

J. K.

CEYLON.

THE foundation-stone of the new Public Markets and Municipal Offices, Colombo, was laid on the 22nd of April last by his Royal Highness the Duke of Edinburgh, in the presence of a large number of spectators, for whom temporary sitting accommodation was provided in an octagonal structure, 70 ft. in diameter. A guard of honour of the 73rd regiment presented arms as the ducal party drove up, the band playing the national anthem, and on alighting under the triumphal arch at the entrance, the Prince and the Governor were received by the chairman and members of the council. The Duke, on advancing to the centre of the octagon, was greeted with loud cheers, and took up a position to the left of the stone. A suitable address was then read by the chairman, and the Prince proceeded to lay the stone in the usual form, assisted by the architect, who had been previously presented to his Royal Highness. The trowel was of chased silver, bearing an appropriate inscription, and the arms of the Municipality, with a ducal coronet at the extremity of the ivory handle. The stone having been declared by the Prince "well and truly laid," the proceedings terminated.

The buildings will consist of two detached blocks, one 200 ft. by 60 ft., running parallel with the face of the site; and the other 170 ft. by 80 ft., at right angles to it in the rear. The central portion of the former will contain the offices of the municipality, with a double row of shops on each side, covered with iron roofs. The rear block, which is to be used as a public market, will be entirely of iron. The buildings generally will be of an ornamental character, and a lofty clock tower is to form a prominent feature. The buildings have been designed by Mr. James G. Smither, Government architect, under whose directions the work is to be carried out.

THE CONDITION OF LINCOLN.

OUR correspondent, "Gargoyle," has sent a reply to "A Lincoln Householder," in which he maintains the correctness of his former statements, and concludes with the observation,—"I still think that at Lincoln the arts are sacrificed at the shrine of Mammon, and that, in their efforts to avoid Scylla, the powers that be are falling fastly into Charybdis."

We do not think it necessary to print the whole. The correspondence will doubtless serve to lead enlightened inhabitants of Lincoln to look about them, and probably result in advantage to the city,—a place of unsurpassed natural beauty, with an unrivalled cathedral, and rich in associations.

SWANSEA WATERWORKS.

SIR,—On the 21st of May (p. 410), and the 4th of June (p. 453), there are some remarks relative to the Swansea Waterworks. Will you allow me briefly to say that Mr. Williams, the contractor, received 500*l.* as a bonus for completing the line of conduit before the time specified in his contract, as Swansea was suffering a water famine. The completion of this conduit enabled Swansea to receive, subsequently, in three years, not less than 3,000 million gallons of water, which, at 2d. per 1,000 gallons, would represent 25,000*l.* This, in my opinion, is a liberal return for the bonus of 500*l.*, and also warrants some expenditure in present repairs. Mr. Williams had, in his contract, a large work to execute, in and over a most difficult country: in my opinion, he did this work well and honestly, and earned all the money paid to him. Works of all kinds require supervision and repairs,—waterworks more, probably, than ordinary works, as water is unceasingly active; and, when confined by an embankment or in a conduit, active for mischief. The conduit at Swansea is some 7 miles 300 yards in length, laid, in part of its course, over a coalfield in work. There are also trees on part of the line, and rootlets have entered at joints not more than 1-16th of an inch wide, which have forced such joints, and caused leakage.

The conduit is, however, now in course of repair, and I hope the cost may not be very large. But, large or small, Mr. Williams, the contractor is not answerable for it. In my opinion, the editor of the *Cambrian* is wrong in stating the cost of the Swansea Waterworks at "160,500*l.*," and the income at "3,500*l.* a year." The cost, including town service-pipes to the extent of nearly 16,000*l.*, as given in my final report, is 70,355*l.* 13s. 8d. This report, with all its details, has been at the service of the editor of the *Cambrian*, but he does not appear to have used it. As to the income of the waterworks, if my recollection be correct, this, in 1868, amounted to upwards of 6,000*l.* per annum, and was increasing. As a rule, I do not notice these local statements, and I now only ask you, Mr. Editor, to give a place to these remarks and explanations to enable me to say that in my opinion the public of Swansea never expended 500*l.* to better purpose than in giving it as a bonus to Mr. Williams, the contractor, for the work done. I wish also to say that Mr. Cousins, the borough engineer, is only responsible for the due maintenance of the works as handed over to him. Personally, I feel under a deep obligation to Mr. Cousins for his untiring courtesy to me during my connexion with Swansea. He has carried out the sewerage and drainage within the town in the best manner, and with good sanitary results.

ROBERT RAWLINSON.

RAFFAELLE AND MICHELANGELO.

BURLINGTON FINE ARTS CLUB.

FEW persons ascending the narrow stairs of 177, Piccadilly, to rooms over a shop, would suppose they were entering the premises of a club that includes a considerable number of well-known lovers of the fine arts, and where, from time to time, very remarkable collections of works of art of past ages are exhibited. Such, however, is the case. A change in this respect, is looming in the distance. The number of members is to be increased from 250 to 500, when the committee will be in a position to recommend removal to a larger house, and to take such other measures as shall increase the advantages of the club. The honorary secretaries are Messrs. Ralph N. Wornum and J. Beavington Atkinson.

The exhibitions, to which we have alluded, have for their object the thorough elucidation of some school, master, or specific art. On the present occasion it consists of a collection of drawings and other illustrations of the works of Raffaelle and Michelangelo of rare merit and interest. Her Majesty the Queen lent for a few days, in aid of the collection, a number of original drawings from the Windsor Castle collection. These have been removed, but what remain will afford ample enjoyment to those who, through knowledge of a member of the club, obtain the privilege of examining them.

"NEW BRITISH INSTITUTION."

A COLLECTION of pictures by old masters and deceased British artists is now on view in the gallery, 39, Old Bond-street. We should belie our convictions if we said that we expect this Institution, as at present constituted, to supply the place of the defunct British Institution, *quoad* an exhibition of "Old Masters." Putting this idea quite on one side, we may fairly say that an interesting collection has been brought together on the present occasion, and will well justify the expenditure of a shilling. Some of the pictures are avowedly the property of dealers, and are for sale; the remainder are lent by owners. In the whole there are 140 pictures, many of them good.

A NOVEL COMPETITION.

THE French Society of Architects of the Department of the North have instituted a competition with the view of making known works of modest merit. They invite the transmission of two photographs of an entrance-door to a private residence, including the door-frame and surroundings, such as the balcony above, should such occur. The selection of the best will be made by the architectural societies with which this society is in connexion. The photographs must be sent by the 30th of September next, and must be from the executed work, not from drawings. Reputation is the chief prize offered, but medals will also be given, besides one complete set of the photographs to the competitor whose work is selected as the best.

As Mr. Vandenbergh, the secretary, who dates from Lille, requests us to make the competition widely known, we conclude it is international. The programme issued by the society may be seen at our Office.

DRAINAGE OF LIVERPOOL.

SIR,—Some two years ago I was permitted, by your favour, to make some observations on the then bad sanitary condition of Liverpool, with its resulting high death-rate, which stood at 36 per thousand. Since that time a vigorous policy of conversion has prevailed; that is, great numbers of privies have, on the certificate of the medical officer of health, been forcibly converted into water-closets, the effect of which, coupled with the late cold spring, has been to reduce the death-rate to 23 per thousand, a rate nearly rivalling the proverbially healthy towns of Salford and Bristol.

Lately, however, a feeling seems to have sprung up among some members of the health committee that their medical officer was doing too much; not exceeding his duty, but straining a point towards the pursuit of health greater than the pockets of the landlords or owners of house property were disposed to bear; and although they have spent already a million of money in sewering the town down to the tideway of the Mersey, yet they are lending a willing ear to each and every one of the systems lately proposed, from the dry-earth system to disinfection, &c., plainly intimating at the same time, though not in a direct manner, that they desire the medical officer to stay his hand; while he, being responsible to the public, is distracted, and does not know how to proceed.

One would think, in face of the facts, and remembering that Liverpool is mainly built on the slopes and top of a high hill forming a rocky bay, with the river at its base, that it would be better to wait a little and see the effects of the various trials now being made in several inland towns, where no such facilities as exist here for the disposal of the sewage are available;—let well alone, in fact, until it is shown that something better is applicable; but no: some evil influence is working, and this public body, the health committee, hold private meetings, from which the reporters are excluded, for the avowed purpose of changing, if possible, the disposal of the sewage of the town. Having in view the large amount of money already spent upon the sewers and the present depressed state of trade, the people look upon these private meetings with some alarm, because it is evident that the creation of a perfectly healthy town is not the primary object of the health committee, or they have only to pursue the policy of conversion to obtain it, and any other object we, the public, hold to be beside their duty. How is it, we ask, that the committee, instead of pursuing a wavering, peripatetic policy, do not order and compel, as they have the power, owners and others to alter and convert privies into water-closets by a given date? Each owner would then be treated like his neighbour, and no favour could be shown or dissatisfaction arise. Life and health are at any time and in any place of vastly greater value than any mere sewage, and the people of Liverpool would be glad of your help towards that object.

B. G.

CAMBERWELL CHARITY ESTATE COMPETITION.

SIR,—For the information of your subscribers who may have been misled by the letter of your correspondent, Mr. Gough, inserted in your issue of the 4th inst., I beg to state that the design sent in by the local surveyor to the charity has not been pronounced the best, &c., by the committee. That it has not been determined to refer the decision on the plans to the Vestry Surveyor. That the terms "surveyor" to the charity and "vestry surveyor" are not synonymous; therefore no competitor has to adjudicate upon the designs. That it has been proposed by the General Purposes Committee "that the vestry appoint some disinterested member of the profession to report upon the plans, and leave the award in his hands;" and that the matter only awaits such a recommendation to be ratified by the vestry.

GEO. W. MARSDEN, Vestry Clerk.

STAINED GLASS.

MESSRS. CLAYTON & BELL completed two important windows for Whit Sunday. One is in *Doncaster Parish Church*, the great window in its south transept, and has been raised in memory of the late Dr. Schofield. The subjects chosen for the work are Scriptural incidents recorded only in the Gospel of "the beloved physician," St. Luke, who, with his emblematic winged bull, is prominently represented in the upper tier of the window. In the middle tier is shown, in a series of subjects, the parable of the Good Samaritan, as especially suited for the memorial of a physician, and additionally so as being a parable recorded by St. Luke only. In the tracery are four angels,—two bearing respectively open books, inscribed "Evangelium" and "Actus Apostolorum;" the other two bearing, in allusion to the medical calling, a skull and a branch of herbs. The work is designed and executed as to style in close conformity with the architecture of the building. The second window is a memorial of Colston, the philanthropist, in the north transept of *Redcliff Church Bristol*, a notice of which we may find another opportunity to give. The cost of it was raised by subscription.

Holy Trinity Church, Preston.—Memorial windows have been put up in the north and south transepts of this church, in stained glass of a grisaille geometrical character. The tracery surmounting each of the openings is filled with foliated work. The windows are in memory of the Rev. C. Robinson, LL.D., for nineteen years incumbent of this church. The cost was 150*l.* They have been supplied by Messrs. Edmundson & Son, of Manchester.

Bath Abbey.—The last addition to the series of painted windows in the abbey is one erected in

the north aisle by the Rev. Prebendary Kemble, to the memory of his son, who died at sea. The idea prevailing throughout the greater part of the design is that of early piety. The family arms occupy the upper compartment in the tracery, and the four small compartments beneath are filled by representations of Isaac, David, Joseph, and Josiah. Each of the lancet lights in the body of the window contains two designs, a larger one and a smaller one, the latter being placed at the bottom. The main subject in the central light is "The Good Shepherd." The two other leading subjects occupy the upper portion of the remaining four lights, "Eli and Samuel" being inserted in the first and second compartments, while in the third and fourth the scene illustrated is Timothy being instructed in the Scriptures by his mother and grandmother. In the lower portion of the window is placed a series of minor designs, three in number. The central one is "Angels raising the Dead from the Deep," which is flanked on the right by a representation of "Elijah raising the Son of the Shunamite Woman," and on the left by the scene of "Our Lord raising the Widow of Nain's Son." The window was designed and executed by Messrs. Clayton & Bell.

Salisbury Cathedral.—A painted glass window has been recently placed in the south transept of this cathedral by Mrs. George Marsh, in memory of her father, the Ven. William Macdonald. The window is the work of Messrs. Clayton & Bell, and in its execution they have observed the characteristics of the various specimens of ancient glass which are to be found in the cathedral, believing that to be the most suitable way of treating the work. The window is divided into five compartments. In the top is the subject, "Noli me tangere." The centre part represents "The Angels and Marys at the Tomb;" and at the bottom of the window is "The Burial of the Saviour."

St. Mary's, Oxford.—The workmen of Messrs. Clayton & Bell, of London, have just inserted, near the principal entrance to this church, a stained-glass window to the memory of the Rev. Isaac Williams, once curate to Dr. Newman, and for many years connected with St. Mary's Church. The design comprises a four-light window, divided with mullions, and the figures in the lights are the four Evangelists, and above them St. Augustine, St. Gregory, St. Jerome, and St. Ambrose. These are surmounted in the scrolls with figures of angels.

DISSENTING CHURCH BUILDING NEWS.

Doncaster.—The Wesleyans of Doncaster are about to build, at a cost of some 7,000*l.*, a new chapel, in St. James's-street, Doncaster, upon a site recently purchased of the corporation for that purpose, and of which Mr. Watson, of Wakefield, is the selected architect. The new chapel will be built in consequence of the existing place of worship in Priory-place having become inadequate to the requirements of the society. The somewhat novel ceremony, so far as a chapel is concerned, of turning the first sod was performed by the Mayor of Doncaster, in the presence of an immense concourse of people. The mayor, who is a churchman, invited the members of the corporation, the ministers of the society, and the building committee, to luncheon at the Mansion House, in honour of the occasion; the Mayor of Leeds being also present. A procession was formed at the Mansion House, headed by the band of the Third West York Militia, the mayors of Doncaster and Leeds, the mace-bearers and police leading, and followed by the corporation, some of the officials of the borough, members and ministers of the Wesleyan society, and about 900 Sunday-school children. A silver spade was presented to the Mayor of Doncaster, with which he performed the ceremony of the day. The chapel is to be built by Mr. Harold Arnold, of Doncaster, and when completed will accommodate 1,000 people. According to Mr. Watson's design, the building will be in the Italian style. It will be erected at the top of the new street now forming in Crowther's-garden, and will face St. James's-street. At each side will be a space of 46 ft. wide. On the right-hand side will be built the boys' school, and on the left the school for the girls and infants. The front elevation and also return staircase wings, will be of stone, having circular-headed doorways and windows on the ground floor; and above, in the centre, there will be a large traceried circular-headed window, which, in all probability, will be filled with stained glass. The extreme size of the chapel building will be 57 ft. 4 in. wide by 107 ft. long. This will include large band-room, ministers' vestry, and other offices on the ground floor at the rear. A gallery will run round both sides and one end. The chapel will be built with a clearstory, which will have seven circular lights on each side, and the clearstory walls will be supported by cast-iron columns and wrought-iron girders, the former also supporting the side galleries. The ground floor and gallery will be filled with stalls; and all the woodwork will be executed in red deal, stained and varnished. The schools on each side are designed to accord with the chapel. The front facings right and left will be of white bricks, with red arches, bands, and other ornamental features. Each school will present a frontage of 85 ft., and each will afford accommodation for 250 children. The tender supplied by Mr. Arnold, of Carr-lane, was for 5,262*l.* Though not the lowest, the committee took into consideration the fact that Mr. Arnold was the owner of the land adjoining their site, and as he was anxious to serve them by erecting near their new chapel houses of first-class appearance, the committee entrusted to him the contract for the building. The total cost of land and building will be a little short of 6,500*l.*

Lightcliffe.—The general committee of the proposed new Congregational chapel has had a meeting, Sir Titus Salt presiding, when the plans for the new church were submitted, after having undergone several alterations. The tower and spire will be 130 ft. high, and the design is Gothic. In the rear of the church a minister's house will be built, in a suitable style to the other building. The total cost, including everything, is about 4,800*l.* The plans were adopted, and Messrs. Lockwood & Mawson, of Bradford, will commence the work as early as possible.

Wokingham.—The foundation-stone of a new Wesleyan chapel has been laid in this town, on the site of an old building. The new chapel will be built by Mr. Whiting, of Reading, from plans prepared by Mr. T. S. Lansdowne, architect, Swindon. The shape of the building is a parallelogram, and it will be composed of red brick, with Bath stone dressings. The roof will be open timber, built diagonally, boarded, stained, and varnished. The seats will be open, stained, and varnished. The style is the fourteenth century Gothic, and the street front will contain three gables, with centre porch, and the roof will be supported on stone corbels. The dimensions are 51 ft. by 33 ft., and there will be accommodation for 350 persons. The cost is about 1,000*l.* It is intended to erect a schoolroom, which will increase the cost to 1,400*l.* The late Mrs. Heelas had given 400*l.* to the building fund, and Sir Francis Lycett, who has contributed to various other Wesleyan chapels in different parts of the country, has given 25*l.* A coloured drawing of the new chapel, by the architect, was exhibited in the Town Hall.

FROM SCOTLAND.

Bonnyrigg.—At a special meeting of Commissioners of Police for the burgh of Bonnyrigg a previous resolution was confirmed "to lease or rent a piece of ground near the burgh, to be used as a pleasure-ground, or place of resort or recreation, in terms of the General Police and Improvement (Scotland) Act, 1862." The park, which is situated on the farm of Polton East Mains, and in close proximity to the burgh, measures 5·27 imperial acres. A lease of ten years, from Martinmas, 1869, is proposed, at the yearly value of 14*l.* 10*s.*; the estimated cost of inclosing the park and effecting other improvements is 72*l.* 10*s.* The total outlay is computed to amount to 100*l.*, and it is proposed to be paid in yearly instalments by an assessment of 1*d.* per pound, which would liquidate the cost in six years.

Glasgow.—The foundation-stone of a new bridge, to be called the Albert-bridge, has been laid at Hutchesontown, Glasgow, by the Earl of Dalhousie, as Grand Master of Freemasons.

Stirling.—The late Mr. Thomas Smith, of Glassingall, who died lately at Avignon, has bequeathed 5,000*l.* for building a museum, picture and sculpture gallery, and artisans' reading-room and library, in Stirling, for the district, with nearly 500 oil paintings, water-colour drawings, and articles of vertu, valued at 6,000*l.*, and 14,000*l.* to endow the institution.

Paisley.—The new scheme for an additional supply of water to the town of Paisley has been inaugurated. A number of gentlemen proceeded to the new filters at Stanely, which is situated immediately below the Braes of Gleniffer, and the provost there formally turned on the water. This extra supply is secured from a large reservoir at Nethertrees, about seven or eight miles from Paisley, and the water is conveyed by gravitation to the filters at Stanely, about three miles from the town. The top of the receiving-tank at the Stanely filters is placed about 10 ft. higher than the top of the High Church steeple, which is erected on the most elevated part of Paisley. The reservoir, when full, will contain 77,000,000 cubic feet, extends over an area of 100 acres, and the maximum depth is 35 ft. The whole scheme is estimated to cost 77,000*l.* The Water Commissioners will be able to pay the interest of the money without increasing the public rates.

Nairn.—Extensive alterations and additions to the Nairn Sheriff Court-house and County Buildings have just been completed. A range of buildings has been added in the rear of the original edifice, which comprises debtors' rooms, prison store-room, new cell accommodation, and the prison governor's house. The exterior of the building has also been improved. A new clock has been placed in a spire.

Dundee.—Recently a movement was commenced by Provost Yeaman, with the view of getting the Old Steeple repaired and renovated; and a numerous meeting of gentlemen, who had been requested by the Town Council to aid in the matter, has been held in the Town Hall. The Town Clerk read letters which he had received from the Earl of Airlie, the Earl of Strathmore, the Earl of Southesk, Lord Wharncliffe, Lord Kinnaird, Sir John Ogilvy, M.P., Mr. Armitstead, M.P., and others, expressing their readiness to have their names placed on the committee, and to assist in defraying the expense of the work of restoration. Resolutions approving of the efforts now being made for the purpose of repairing and restoring the steeple in accordance with its original style of architecture, and agreeing to take the advice of Mr. Robert Mathieson, Assistant Surveyor of Woods and Forests, as to what is necessary to be done, were unanimously agreed to. The Old Steeple is supposed to have been erected during the fourteenth century.

Perth.—The foundation-stone of the new church in Tay-street, for the Free West congregation, Perth, has been laid by the Earl of Dalhousie. The design for the new structure was prepared by Mr. J. Honeyman, jun., architect, Glasgow. The building was commenced in the autumn of last year, and considerable progress has since been made. The site is about midway between the Post Office and the County Buildings, on the line of Tay-street. The structure will be in the style of church architecture which prevailed in the middle of the thirteenth century in France and other Continental countries. The length of the building, exclusive of the vestry and the proposed Presbytery Hall, is 114 ft., and the width 63 ft. The main entrance to the church will be in the base of the tower, fronting Tay-street and the river, the lower part of the tower forming a porch. The tower will measure 30 ft. over the buttresses, and the height from the pavement to the top of the spire will be 212 ft. The church will be divided into three aisles by iron columns supporting the sides, galleries, and roof. The ceilings will be plastered, but the principal couples, which are very ornamental, and the purlins will be exposed to view. The height of the centre aisle from floor to ceiling will be 43 ft. Provision will be made for ventilating the church by drawing the vitiated air into the tower. The pews will be 33 in. wide, affording a space of 20 in. to each sitter. Accommodation will be provided for upwards of 1,000 persons; and it is understood that the total cost, exclusive of the site, will be about 8,000*l.*——The opening of a new Roman Catholic church, dedicated to Our Lady of Perpetual Succour, in connexion with St. Mary's Redemptorist College, Kinnoull, Perth, has taken place. The new church is immediately to the north of the collegiate buildings, which, together with the church, were designed by Mr. Heiton, architect, Perth. The church is in the Early English style.

Inverness.—The new public markets have been formally opened by the magistrates and town council. The building has been about a year in course of construction, and is erected on the open space where the markets were formerly held. The site is central, the main front being in Academy-street, directly opposite the railway station, while at the extreme end there is an entrance from Church-street, and there is also a

side gateway into Union-street. The whole building is easy of access. The cost of erection was about 3,000*l*. The architects were Messrs. Matthews & Lawrie, of Inverness and Aberdeen.

Rothes.—The foundation stone of a spire, which will be furnished with a clock, has been laid in Rothes. The ceremony was performed with Masonic honours. The carpenters' society, and the children attending the various schools in the town, took part in the procession, and the Volunteers acted as a guard of honour. The work has been instituted by the Rev. George Gray, of the parish church, on which building the spire will be erected. The cost is estimated at 300*l*.

Greenock.—Serious damage has been done to the new works of the Greenock Water Trustees at the Gryfe, the repairing of which it is estimated will cost fully 2,000*l*. It is stated that the masonry of the wall was not sufficient to withstand the weight of the embankment behind it, and was forced in, and that the embankment will have to be cut out, and the tunnel rebuilt.

Books Received.

A Guide to the Construction and Management of Workhouses: together with the Consolidated Order as amended by subsequent Orders of the Poor-law Board. By EDWARD SMITH, F.R.S., &c., Medical Officer of the Poor-law Board, and Poor-law Inspector. Knight & Co., Fleet-street. 1870.

DR. SMITH has here prepared a Guide which, in a compendious form, includes sanitary, legal, and general observations, and supplies the requirements of the local executive on all the duties which devolve upon them.

The Consolidated Order has been printed as the third part of the work, and those clauses which have been amended or superseded by subsequent orders of the Poor-law Board have been indicated and altered.

The increased attention which has recently been given to this subject has led to improved administration, with an expenditure of very large sums of money, and has induced the Poor-law Board to express their views on certain subjects more definitely than heretofore, by the issue of "Instructions" and "Suggestions," all of which are printed in this work, and will be at hand for reference.

Architects have long desired such "Instructions" when preparing plans; and we may expect that those officially issued, with the remarks upon the selection of sites, and the arrangement of the different blocks of buildings constituting the workhouse, which are given in this book, will lead to the saving of time and expense in the performance of that duty.

The instructions on the site, drainage, and water supply, construction, and arrangements of workhouses, are full and detailed, and constitute a chapter of the book in themselves.

The Mystery of Edwin Drood. By CHARLES DICKENS. Parts I., II., and III. London: Chapman & Hall.

THE last chapter of this tale published closes with the sentence,—"And thus, as everything comes to an end, the unaccountable expedition comes to an end—for the time." Little thought the thousands who read it that the expedition of the great novelist himself had come to an end,—here; that the busy brain that was evolving the mystery about which were clustering new acquaintances, and through which fresh insights to man's heart were to be gained, would work no more,—that a dear friend, though possibly unknown in the flesh, had passed away, and that Charles Dickens would write no more. The universal opinion as to the value of his works has been shown by a wide burst of sympathy, and it is not too much to say that England and America feelingly weep his loss. More than one strange coincidence with reference to his death has been mentioned, notably the circumstance that dying, as he did, on the 9th of June, 1870, on the 9th of June, 1865, he most narrowly escaped death on the South-Eastern Railway. It is a small circumstance, still it is cognate, that the first advertisement in each of the published numbers of "Edwin Drood" is one of "mourning," surrounded with a wide black border.

Concerning the remainder of the work, the publishers have in type something more than enough for three numbers, in the whole rather more than half the work. It was at first thought that Mr. Dickens had left a rough scheme of the complete work behind him, but at present this has not been found, and we believe we may state that no attempt will be made by another hand to finish it. It may interest some to know that more than 50,000 copies were sold of No. 1, and that the steady sale, judging from that of the after numbers, promised to be 40,000.

All our readers, doubtless, by this time, have heard that on Tuesday morning last, early, and quite privately, the remains of our great novelist were buried in Westminster Abbey. The grave is in Poets' Corner, at the foot of Handel's, the head of Sheridan's, and between Lord Macaulay and Cumberland, the dramatic poet. A few feet removed, and near to the side of Dickens, but towards his feet, lie Johnson and Garrick, while near them repose the remains of Campbell. The statue of Addison and the bust of Thackeray overlook the grave at its head: Shakspeare's monument is not far from its foot, and Goldsmith's monument is on the left.

VARIORUM.

We are glad to learn that the "Photographic Art Journal" is about to give up its second-hand title, to which we objected on its first appearance, and is about to appear with a new one in a fresh form. No. 4 includes a clever reproduction by the Woodbury process, of a painting called "Le Favori du Roi," by a rising Spanish artist, M. Zanavis, and one of a beautiful study of heads and hands by Raffaelle.——Mr. Bailey Denton has published in a separate form (through Messrs. Spon, Charing-cross), his paper on "Sewage Farming," with remarks on the position of sewer authorities in relation to lands to which sewage is applied, first read before the Central Farmers' Club in March last.——"Report to the Tottenham Local Board of Health on the Disposal of the Sewage of their District, May, 1870. London: Spon." The Committee who so report have, after considerable investigation and trouble, come to the conclusion that irrigation is the best mode of disposing of sewage. They deprecate the idea that sewage farms are "miasmatic fields," "putrid quagmires," or anything of the sort; and assert, on the contrary, that as a rule the mere visitor would not know that he was on a sewage farm at all. They have had no difficulty in finding land wherewith to commence sewage farming at Tottenham.——"The Tenth Annual Report of the Amalgamated Society of Carpenters and Joiners, from December, 1868, to December, 1869. Kenny, Printer, Camden-road." From the remarks of Mr. Applegarth, the general secretary, it appears that, notwithstanding the continued depression of trade, the operations and progress of the society have been highly satisfactory. The increase made in members and funds, however, is not equal to that of 1868; but the increase made, the suffering and distress relieved and prevented, and the quiet useful work done, are said to furnish cause for congratulation. After meeting an exceptionally heavy expenditure, there is a balance of 446*l*. 18s. 5½d. ont of the year's income. The society has admitted 569 new members, and opened seventeen new branches, five of them in the London district, four of which were old-established local societies.——"The Nineteenth Annual Report of the Amalgamated Society of Engineers, Machinists, Smiths, &c., for 1869. Kenny, Camden-road, Printer." The general secretary, Mr. W. Allen, states that he has to record a very large diminution in the funds; indeed, so much so that, notwithstanding the fact of their income having amounted to no less a sum than 82,406*l*. 13s. 2½d., their expenditure has exceeded that amount by 22,521*l*. 14s. 4½d., the total expenditure for 1869 having been 104,928*l*. 7s. 6d., or 4,881*l*. 11s. 5d. less than in 1868. This large expenditure has entirely resulted from the lengthened depression of trade experienced not only in the United Kingdom, but in our Colonies and the United States of America—such a depression as the society have never encountered before, and which is attributed to the unsettled state of commerce in the country, and want of confidence generally in the trading community. However, although they have had three years of unprecedented bad trade, the society has been enabled to meet all its engagements, and still be in possession of a large reserve fund at the close of 1869. On the last meeting night in 1868 the balance in hand amounted to 98,699*l*. 2s. 1½d., to which must be added the income for 1869, namely 82,406*l*. 13s. 2½d., making in all 181,105*l*. 15s. 4d., from which sum is required to be deducted 104,929*l*. 7s. 6d., the total expenditure, leaving a net balance of 76,176*l*. 7s. 10d. During the twelve months the society have paid as donation to unemployed members the sum of 59,980*l*. 7s. 1½d.; to sick members, 17,777*l*. 18s. 10½d.; to superannuated members, 8,055*l*. 17s. 8d.; in sixteen cases of accident, as per 23rd rule, 1,600*l*.; and for funeral benefit, 5,600*l*. 8s. 2d.; being in all 93,014*l*. 11s. 10d. paid in support of the five principal benefits of the society, or 2*l*. 15s. 5½d. per member.——"Notes to accompany a Series of Photographs designed to illustrate the Ancient Architecture of Southern India. Taken for Government, and described by Captain LYON. Edited by JAMES FERGUSSON, F.R.S. London: Marion & Co."—In these Notes are described, according to the Preface, nearly all the temples worthy of a visit in the South of India. The Notes are given gratis to the purchaser of ten of the photographs. The text has been revised and corrected by Mr. Fergusson. ——"Plan for conveying Railway Trains across the Straits of Dover; showing the Origin of the Idea. By Evan Leigh, F.S.A. London: Longmans & Co." The author of this pamphlet says, in the outset,—

"In the year 1861, I first conceived the idea of conveying railway trains across the Straits of Dover, and took out a patent for it, connected with some other nautical matters. In the following year I exhibited my patent ship in London to the Lords of the Admiralty and a number of other scientific gentlemen, including Mr. Scott Russell, having been introduced to most of them by Rear-Admiral Denman. After this I sent my models to the Great Exhibition of London in that year, and distributed hundreds of lithographs, with a printed description of my new ship, showing how railway trains might be conveyed across the Straits of Dover or other narrow seas. A great amount of curiosity was excited at the novelty of the idea, this being the first that was proposed."

Mr. Leigh appears to have since improved his scheme. The paddles are protected, by being inserted amidships and not at the sides, and the form of paddle is like that of water-wheels. There are no chains for the trains to be dependent on; and as the boat will not draw more than 7 ft. or 8 ft. of water at most, with train and coal on board, if made without pontoons, and only about 12 ft. with them, it would be unnecessary to change the present route, *vid* Calais, Boulogne, or any other port.

Miscellanea.

Moving a Windmill Entire, for Sixteen Miles.—A novel experiment, though not quite so sensational as the moving of a hotel at Chicago, has been the removal of a wind flour-mill, with all its fittings, from Westacre to Clenchwarton, Norfolk. The mill is a wooden structure, and, with its machinery, of enormous weight. It stood upon wheels, and having been purchased by a man living at Clenchwarton, he determined to endeavour to draw it along the road by a traction-engine, but all efforts to find one strong enough proved ineffectual; the application, however, of a powerful steam cultivation engine proved more successful. In passing along the route various expedients had to be tried, such as in ascending a hill the engine proceeded to the summit, and then pulled the mill up with a chain, and so carefully had the task to be performed, that it occupied three days to make the journey. In crossing the Ouze, it was feared the celebrated long bridge would not be strong enough, but the engine having first passed over, the mill itself was drawn over, the bridge timbers creaking.

Projected Improvements at the County Gaol, Chelmsford.—The Committee of Justices appointed to carry out the enlargement of the cells in the two old wings of the county gaol at Springfield, and to alter them so as to correspond with the cells occupied by the female prisoners in the other wing, have met to examine the tenders sent in for carrying out the works. The following tenders were opened, the lowest on the list being accepted:—Adamson, 5,726*l*.; Munday, 5,500*l*.; Capon, Manningtree, 5,300*l*.; J. Grimes, 5,039*l*.; Wells, 4,700*l*.; J. Brown, 4,650*l*.; Runnicles, 4,547*l*.; Parmenter, 4,515; Saunders, Dedham, 4,430*l*. (accepted).

The Architectural Association.—At the ordinary meeting, on the 3rd of June, Mr. T. Blashill read what was entitled "A Paper on Papers," the principal purpose of which appeared to be to urge young men to work rather than to read, and to acquire knowledge practically instead of taking it up second-hand.

To See Down a Well.—The New Hampshire *Journal of Agriculture* suggests an excellent plan for exploring the bottom of a well:—"It is not generally known how easy a matter it is to examine the bottom of a well, cistern, or pond of water by the use of a common mirror. When the sun is shining brightly hold a mirror so that the reflected rays of light will fall into the water. A bright spot will be seen at the bottom, so light as to show the smallest object very plainly. By this means we have examined the bottoms of wells 50 ft. deep, when half full or more of water. The smallest straw or other small object can be perfectly seen from the surface. In the same way one can examine the bottom of ponds and rivers, if the water be somewhat clear, and not agitated by winds or rapid motion. If a well or cistern be under cover, or shaded by buildings, so that the sunlight will not fall near the opening, it is only necessary to employ two mirrors, using one to reflect the light to the opening, and another to send it down perpendicularly into the water. Light may be thrown fifty or a hundred yards to the precise spot desired, and then reflected downward. We have used the mirror with success to reflect the light around a field to a shaded spot, and also to carry it from a south window through two rooms, and then into a cistern under the side of a house. Half a dozen reflections may be made, though each mirror diminishes the brilliancy of the light. Let any one not familiar with this method try it, and he will find it not only useful, but a pleasing experiment. It will, perhaps, reveal a mass of sediment, at the bottom of a well, that has been little thought of, but which may have been a fruitful source of disease, by its decay in the water."

The "Clameur de Haro."—The States of Jersey gave the English railway company that is forming a line between the towns of St. Heliers and St. Aubin the site of the slaughter-houses at the head of St. Heliers Harbour for the erection of a railway station. The grant, however, was attended with certain conditions respecting the providing of suitable accommodation for slaughtering. The contractor had proceeded to abolish the buildings without complying with the necessary conditions, when Mr. David de Quetteville, one of the judges of the Royal Court, proceeded to the spot, and raised the *Clameur de Haro*, which consists in the person raising it falling on his knees and crying out, "*Haro! Haro! A l'aide, mon prince, on me fait tort!*" The workmen immediately desisted, as they were bound to do under a heavy penalty, and the work was stopped. A special meeting of the States (the Island Parliament), was convened, and it was resolved, after a stormy discussion, to prevent any further proceeding with the work until a satisfactory agreement had been made with the company for the erection of new slaughter-houses.

The Prehistoric Remains at Dartmoor. At a recent meeting of the Ethnological Society, Mr. C. Spence Bate presented a "Report on the Prehistoric Antiquities of Dartmoor," forming one of the series of reports being now collected by the society with a view to obtaining accurate information on the present condition of the megalithic monuments of this country. After noticing the physical features of the district, the author described in detail the numerous stone circles, avenues, menhirs, cromlechs, cairns, and other prehistoric monuments of Dartmoor. He suggests the idea that the stones in some of the avenues may have been erected in commemoration of the death of persons of distinction, one being added for each burial. The depressions on the summits of some of the cairns were regarded rather as indications of unfinished work than of subsequent disturbance by treasure-seekers. Evidence was adduced of the wanton destruction of the granite blocks in some of the cromlechs; and both in the paper and in the subsequent discussion attention was directed to the importance of extending legislative protection for these prehistoric monuments.

Telegraphic Communication.—It is understood that application has been made for letters patent for constructing a cylindrical iron kerb for reception, repairing, and maintaining telegraph wires, to be of the same external form and size as the stone kerb now in use. Should this, in the opinion of practical men, be available, it must be a means of extending telegraphic communication, and prove of great public utility and economy, by preventing the constant necessity of taking up the roadways and pavements.

Palmyra and Tadmor.—The wife of Capt. Burton, the traveller, writes to the *Morning Post*, from Damascus a pleasant letter about the East. She states that the road to Palmyra and Tadmor is now open to European travellers. She has visited them, and says that Palmyra is only worth visiting if some days can be given to it, especially to examine the old Palmyrene tomb-towers which there represent the pyramids. Old Tadmor and its vicinity it would not be difficult, she thinks, to revive and cultivate when there is protection for life. Speaking of the tomb-towers, Mrs. Burton says:—"There are three tomb-towers which still may yield results; the people call them Kasr el Zayneh (pretty palace), Kasr el Azba (palace of the maiden), and Kasr el Arus (palace of the bride). Explorers, however, must bring ropes and hooks, ladders which will reach to 80 ft., planks to bridge over broken staircases, and a stout crowbar. We had none of these things. I have little doubt that the upper stories still contain mummies, tesseræ, and other curiosities. We made sundry excavations, but we lacked implements, and our stay was not long enough for good results. The march from Damascus to Palmyra may be done in four days by strong people well mounted, as we did on return."

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Cordova International Exhibition, 1870-71.—An exhibition of works of art, manufactures, produce, &c., will take place at Cordova, from October 15th, 1870, to January 15th, 1871, under the management of a board of directors appointed by decree of the national government, dated December 9th, 1868. In addition to the contributions of native exhibitors, certain manufactures are specially invited from foreign countries.

side gateway into Union-street. The whole building is easy of access. The cost of erection was about 3,000*l.* The architects were Messrs. Matthews & Lawrie, of Inverness and Aberdeen.

Rothes.—The foundation stone of a spire, which will be furnished with a clock, has been laid in Rothes. The ceremony was performed with Masonic honours. The carpenters' society, and the children attending the various schools in the town, took part in the procession, and the Volunteers acted as a guard of honour. The work has been instituted by the Rev. George Gray, of the parish church, on which building the spire will be erected. The cost is estimated at 300*l.*

Greenock.—Serious damage has been done to the new works of the Greenock Water Trustees at the Gryfe, the repairing of which it is estimated will cost fully 2,000*l.* It is stated that the masonry of the wall was not sufficient to withstand the weight of the embankment behind it, and was forced in, and that the embankment will have to be cut out, and the tunnel rebuilt.

Books Received.

A Guide to the Construction and Management of Workhouses: together with the Consolidated Order as amended by subsequent Orders of the Poor-law Board. By EDWARD SMITH, F.R.S., &c., Medical Officer of the Poor-law Board, and Poor-law Inspector. Knight & Co., Fleet-street. 1870.

DR. SMITH has here prepared a Guide which, in a compendious form, includes sanitary, legal, and general observations, and supplies the requirements of the local executive on all the duties which devolve upon them.

The Consolidated Order has been printed as the third part of the work, and those clauses which have been amended or superseded by subsequent orders of the Poor-law Board have been indicated and altered.

The increased attention which has recently been given to this subject has led to improved administration, with an expenditure of very large sums of money, and has induced the Poor-law Board to express their views on certain subjects more definitely than heretofore, by the issue of "Instructions" and "Suggestions," all of which are printed in this work, and will be at hand for reference.

Architects have long desired such "Instructions" when preparing plans; and we may expect that those officially issued, with the remarks upon the selection of sites, and the arrangement of the different blocks of buildings constituting the workhouse, which are given in this book, will lead to the saving of time and expense in the performance of that duty.

The instructions on the site, drainage, and water supply, construction, and arrangements of workhouses, are full and detailed, and constitute a chapter of the book in themselves.

The Mystery of Edwin Drood. By CHARLES DICKENS. Parts I., II., and III. London: Chapman & Hall.

THE last chapter of this tale published closes with the sentence,—"And thus, as everything comes to an end, the unaccountable expedition comes to an end—for the time." Little thought the thousands who read it that the expedition of the great novelist himself had come to an end,—here; that the busy brain that was evolving the mystery about which were clustering new acquaintances, and through which fresh insights to man's heart were to be gained, would work no more,—that a dear friend, though possibly unknown in the flesh, had passed away, and that Charles Dickens would write no more. The universal opinion as to the value of his works has been shown by a wide burst of sympathy, and it is not too much to say that England and America feelingly weep his loss. More than one strange coincidence with reference to his death has been mentioned, notably the circumstance that dying, as he did, on the 9th of June, 1870, on the 9th of June, 1865, he most narrowly escaped death on the South-Eastern Railway. It is a small circumstance, still it is cognate, that the first advertisement in each of the published numbers of "Edwin Drood" is one of "mourning," surrounded with a wide black border.

Concerning the remainder of the work, the publishers have in type something more than enough for three numbers, in the whole rather more than half the work. It was at first thought that Mr. Dickens had left a rough scheme of the complete work behind him, but at present this has not been found, and we believe we may state that no attempt will be made by another hand to finish it. It may interest some to know that more than 50,000 copies were sold of No. 1, and that the steady sale, judging from that of the after numbers, promised to be 40,000.

All our readers, doubtless, by this time, have heard that on Tuesday morning last, early, and quite privately, the remains of our great novelist were buried in Westminster Abbey. The grave is in Poets' Corner, at the foot of Handel's, the head of Sheridan's, and between Lord Macaulay and Cumberland, the dramatic poet. A few feet removed, and near to the side of Dickens, but towards his feet, lie Johnson and Garrick, while near them repose the remains of Campbell. The statue of Addison and the bust of Thackeray overlook the grave at its head: Shakspeare's monument is not far from its foot, and Goldsmith's monument is on the left.

VARIORUM.

We are glad to learn that the "Photographic Art Journal" is about to give up its second-hand title, to which we objected on its first appearance, and is about to appear with a new one in a fresh form. No. 4 includes a clever reproduction by the Woodbury process, of a painting called "Le Favori du Roi," by a rising Spanish artist, M. Zanaivls, and one of a beautiful study of heads and hands by Raffaelle.——Mr. Bailey Denton has published in a separate form (through Messrs. Spon, Charing-cross), his paper on "Sewage Farming," with remarks on the position of sewer authorities in relation to lands to which sewage is applied, first read before the Central Farmers' Club in March last.——"Report to the Tottenham Local Board of Health on the Disposal of the Sewage of their District, May, 1870. London: Spon." The Committee who so report have, after considerable investigation and trouble, come to the conclusion that irrigation is the best mode of disposing of sewage. They deprecate the idea that sewage farms are "miasmatic fields," "putrid quagmires," or anything of the sort; and assert, on the contrary, that as a rule the mere visitor would not know that he was on a sewage farm at all. They have had no difficulty in finding land wherewith to commence sewage farming at Tottenham.——"The Tenth Annual Report of the Amalgamated Society of Carpenters and Joiners, from December, 1868, to December, 1869. Kenny, Printer, Camden-road." From the remarks of Mr. Applegarth, the general secretary, it appears that, notwithstanding the continued depression of trade, the operations and progress of the society have been highly satisfactory. The increase made in members and funds, however, is not equal to that of 1868; but the increase made, the suffering and distress relieved and prevented, and the quiet useful work done, are said to furnish cause for congratulation. After meeting an exceptionally heavy expenditure, there is a balance of 446*l.* 18s. 5½d. out of the year's income. The society has admitted 569 new members, and opened seventeen new branches, five of them in the London district, four of which were old-established local societies.——"The Nineteenth Annual Report of the Amalgamated Society of Engineers, Machinists, Smiths, &c., for 1869. Kenny, Camden-road, Printer." The general secretary, Mr. W. Allen, states that he has to record a very large diminution in the funds; indeed, so much so that, notwithstanding the fact of their income having amounted to no less a sum than 82,406*l.* 13s. 2½d., their expenditure has exceeded that amount by 22,521*l.* 14s. 4½d., the total expenditure for 1869 having been 104,928*l.* 7s. 6d., or 4,881*l.* 11s. 5d. less than in 1868. This large expenditure has entirely resulted from the lengthened depression of trade experienced not only in the United Kingdom, but in our Colonies and the United States of America—such a depression as the society have never encountered before, and which is attributed to the unsettled state of commerce in the country, and want of confidence generally in the trading community. However, although they have had three years of unprecedented bad trade, the society has been enabled to meet all its engagements, and still be in possession of a large reserve fund at the close of 1869. On the last meeting night in 1868 the balance in hand amounted to 98,699*l.* 2s. 1½d., to which must be added the income for 1869, namely 82,406*l.* 13s. 2½d., making in all 181,105*l.* 15s. 4d., from which sum is required to be deducted 104,929*l.* 7s. 6d., the total expenditure, leaving a net balance of 76,176*l.* 7s. 10d. During the twelve months the society have paid as donation to unemployed members the sum of 59,980*l.* 7s. 1½d.; to sick members, 17,777*l.* 18s. 10½d.; to superannuated members, 8,055*l.* 17s. 8d.; in sixteen cases of accident, as per 23rd rule, 1,600*l.*; and for funeral benefit, 5,600*l.* 8s. 2d.; being in all 93,014*l.* 11s. 10d. paid in support of the five principal benefits of the society, or 2*l.* 15s. 5½d. per member.——"Notes to accompany a Series of Photographs designed to illustrate the Ancient Architecture of Southern India. Taken for Government, and described by Captain LYON. Edited by JAMES FERGUSSON, F.R.S. London: Marion & Co."—In these Notes are described, according to the Preface, nearly all the temples worthy of a visit in the South of India. The Notes are given gratis to the purchaser of ten of the photographs. The text has been revised and corrected by Mr. Fergusson.——"Plan for conveying Railway Trains across the Straits of Dover; showing the Origin of the Idea. By Evan Leigh, F.S.A. London: Longmans & Co." The author of this pamphlet says, in the outset,—

"In the year 1861, I first conceived the idea of conveying railway trains across the Straits of Dover, and took out a patent for it, connected with some other nautical matters. In the following year I exhibited my patent ship in London to the Lords of the Admiralty and a number of other scientific gentlemen, including Mr. Scott Russell, having been introduced to most of them by Rear-Admiral Denman. After this I sent my models to the Great Exhibition of London in that year, and distributed hundreds of lithographs, with a printed description of my new ship, showing how railway trains might be conveyed across the Straits of Dover or other narrow seas. A great amount of curiosity was excited at the novelty of the idea, this being the first that was proposed."

Mr. Leigh appears to have since improved his scheme. The paddles are protected, by being inserted amidships and not at the sides, and the form of paddle is like that of water-wheels. There are no chains for the trains to be dependent on; and as the boat will not draw more than 7 ft. or 8 ft. of water at most, with train and coal on board, if made without pontoons, and only about 12 ft. with them, it would be unnecessary to change the present route, *vid* Calais, Boulogne, or any other port.

Miscellanea.

Moving a Windmill Entire, for Sixteen Miles.—A novel experiment, though not quite so sensational as the moving of a hotel at Chicago, has been the removal of a wind flour-mill, with all its fittings, from Westacre to Clenchwarton, Norfolk. The mill is a wooden structure, and, with its machinery, of enormous weight. It stood upon wheels, and having been purchased by a man living at Clenchwarton, he determined to endeavour to draw it along the road by a traction-engine, but all efforts to find one strong enough proved ineffectual; the application, however, of a powerful steam cultivation engine proved more successful. In passing along the route various expedients had to be tried, such as in ascending a hill the engine proceeded to the summit, and then pulled the mill up with a chain, and so carefully had the task to be performed, that it occupied three days to make the journey. In crossing the Ouze, it was feared the celebrated long bridge would not be strong enough, but the engine having first passed over, the mill itself was drawn over, the bridge timbers creaking.

Projected Improvements at the County Gaol, Chelmsford.—The Committee of Justices appointed to carry out the enlargement of the cells in the two old wings of the county gaol at Springfield, and to alter them so as to correspond with the cells occupied by the female prisoners in the other wing, have met to examine the tenders sent in for carrying out the works. The following tenders were opened, the lowest on the list being accepted:—Adamson, 5,726*l.*; Munday, 5,500*l.*; Capon, Manningtree, 5,300*l.*; J. Grimes, 5,039*l.*; Wells, 4,700*l.*; J. Brown, 4,650*l.*; Runnicles, 4,547*l.*; Parmenter, 4,515; Saunders, Dedham, 4,430*l.* (accepted).

The Architectural Association.—At the ordinary meeting, on the 3rd of June, Mr. T. Blashill read what was entitled "A Paper on Papers," the principal purpose of which appeared to be to urge young men to work rather than to read, and to acquire knowledge practically instead of taking it up second-hand.

To See Down a Well.—The New Hampshire *Journal of Agriculture* suggests an excellent plan for exploring the bottom of a well:—"It is not generally known how easy a matter it is to examine the bottom of a well, cistern, or pond of water by the use of a common mirror. When the sun is shining brightly hold a mirror so that the reflected rays of light will fall into the water. A bright spot will be seen at the bottom, so light as to show the smallest object very plainly. By this means we have examined the bottoms of wells 50 ft. deep, when half full or more of water. The smallest straw or other small object can be perfectly seen from the surface. In the same way one can examine the bottom of ponds and rivers, if the water be somewhat clear, and not agitated by winds or rapid motion. If a well or cistern be under cover, or shaded by buildings, so that the sunlight will not fall near the opening, it is only necessary to employ two mirrors, using one to reflect the light to the opening, and another to send it down perpendicularly into the water. Light may be thrown fifty or a hundred yards to the precise spot desired, and then reflected downward. We have used the mirror with success to reflect the light around a field to a shaded spot, and also to carry it from a south window through two rooms, and then into a cistern under the side of a house. Half a dozen reflections may be made, though each mirror diminishes the brilliancy of the light. Let any one not familiar with this method try it, and he will find it not only useful, but a pleasing experiment. It will, perhaps, reveal a mass of sediment, at the bottom of a well, that has been little thought of, but which may have been a fruitful source of disease, by its decay in the water."

The "Clameur de Haro."—The States of Jersey gave the English railway company that is forming a line between the towns of St. Heliers and St. Aubin the site of the slaughter-houses at the head of St. Heliers Harbour for the erection of a railway station. The grant, however, was attended with certain conditions respecting the providing of suitable accommodation for slaughtering. The contractor had proceeded to abolish the buildings without complying with the necessary conditions, when Mr. David de Quetteville, one of the judges of the Royal Court, proceeded to the spot, and raised the *Clameur de Haro*, which consists in the person raising it falling on his knees and crying out, "*Haro! Haro! A l'aide, mon prince, on me fait tort!*" The workmen immediately desisted, as they were bound to do under a heavy penalty, and the work was stopped. A special meeting of the States (the Island Parliament), was convened, and it was resolved, after a stormy discussion, to prevent any further proceeding with the work until a satisfactory agreement had been made with the company for the erection of new slaughter-houses.

The Prehistoric Remains at Dartmoor. At a recent meeting of the Ethnological Society, Mr. C. Spence Bate presented a "Report on the Prehistoric Antiquities of Dartmoor," forming one of the series of reports being now collected by the society with a view to obtaining accurate information on the present condition of the megalithic monuments of this country. After noticing the physical features of the district, the author described in detail the numerous stone circles, avenues, menhirs, cromlechs, cairns, and other prehistoric monuments of Dartmoor. He suggests the idea that the stones in some of the avenues may have been erected in commemoration of the death of persons of distinction, one being added for each burial. The depressions on the summits of some of the cairns were regarded rather as indications of unfinished work than of subsequent disturbance by treasure-seekers. Evidence was adduced of the wanton destruction of the granite blocks in some of the cromlechs; and both in the paper and in the subsequent discussion attention was directed to the importance of extending legislative protection for these prehistoric monuments.

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Another Discovery in Palestine.—An important discovery is said, by the *North German Correspondent*, to have been made at Jerusalem. It is an old stone, bearing the figure of a god sitting on a throne, with priests on both sides, and a Hunyaritish inscription two lines in length. It was brought from Yeman, and was offered for sale. Dr. Oscar Meyer, the Chancellor of the North German Confederate Consulate, obtained an impression, which is at present in the hands of the Confederate Consul, Dr. Blau, who is residing for a time at Berlin. The inscription is said to contain the name of "Athtar," or Astarte.

Suffocation in a Well.—A labourer has been killed by foul air while being lowered into a new well in course of being sunk at the new asylum, Longdales, Bothwell. Water had been found at a depth of 57 ft., and for two or three days the well remained closed. The man was lowered with his foot on a rope attached to a windlass wrought by two labourers. As the apparatus neared the bottom, these two men heard him shouting, and asked what he wanted. No answer being returned, they raised the rope, and were shocked to discover his dead body hanging head downwards.

Cordova International Exhibition, 1870-71.—An exhibition of works of art, manufactures, produce, &c., will take place at Cordova, from October 15th, 1870, to January 15th, 1871, under the management of a board of directors appointed by decree of the national government, dated December 9th, 1868. In addition to the contributions of native exhibitors, certain manufactures are specially invited from foreign countries.

The Bath and West of England Show.—The Exhibition of the Bath and West of England Society has been held at Taunton. The arts department comprises some illustrations of metal work, with reproductive copies of the more remarkable specimens from both public and private collections in this country, and other parts of Europe. The Kensington Museum contributes, as it did last year, some specimens in majolica. Several classes of pottery are included in the contribution. A portion of a case is set apart to illustrate the application of the fine arts to the chief manufactures of France. Patent Roman tiles for roofing, patent ridge tiles, and patent eave tiles are exhibited in the open grounds; and Messrs. Searle & Son, builders, Bridgwater, have erected for the exhibitors, in red and grey moulded bricks, covered with tiles, an ornamental model cattle-shed.

The Oxford Architectural Society.—An excursion to Somerton, North Aston, Steeple Aston, and Lower Heyford, has taken place. The party were received at Somerton, by Mr. Wing, of Steeple Aston, who assisted in pointing out the principal objects of interest there, and at North and Steeple Aston, where the party were received by the Rev. J. H. Brookes, the rector, who hospitably entertained them at the Rectory, and exhibited the well-known examples of the fourteenth-century needlework belonging to this church. Rousham was next visited, though the time remaining was so short as to allow of little more than a glance at the church, though the party were kindly invited to pass through the grounds of Rousham, on their way to the station.

Longhope Church.—The spire and upper part of the tower of this church have for some time past been in a dilapidated condition; the belfry floors were decayed, the bell carriages unsafe, and the bells for a long time have preserved an enforced silence. The vicar and churchwardens therefore took the matter in hand, and have placed the edifice in safety. The spire has been taken down, together with the tower to the ringing-floor; the stonework has been rebuilt, and the tower furnished with crocketed pinnacles. The work has been executed by Mr. Organ, of Mitcheldean, under the superintendence of Mr. Maberley, architect, Gloucester.

Electricity in Thrashing.—"R. T." says,—Electricity will open and expand loose fibrous substances. The beautiful rose will partly unfold itself. Why not the husk of corn which envelops each grain be made to open? I presume a slight application of a brush or stick would drop every grain; steam-thrashing would then be an operation of the past. I was led to form this idea by the appearance of a Blue-coat school-boy partaking of a long and strong dose of electricity; his short hair stood upright,—he resembled a young porcupine astonished at a bugbear!

A New Gate.—A novel invention in the shape of a self-acting gate has been introduced, the construction of which is simple and ingenious. In driving up to the entrance the carriage-wheel passes over an iron, so connected by an underground rod with the hinges of the gate, that the latch end is elevated, and the top so inclined that the gate swings open by its own weight. The carriage in passing runs over a second wheel-iron, which causes the gate to close and securely latch. The movement is attended with no delay.

Electricity Utilised.—At the last exhibition of the American Institute, there was seen an elliptic lock-stitch sewing-machine, driven by a small electric engine, which might easily be put into a common hat-box. A series of eight magnets are set on the periphery of a circle, and around these revolves an armature of steel, which is continuously propelled by the magnetic action, and thus operates the machinery that moves the needle. The current may be cut off entirely, or the speed of the needle graduated as may be desired. The inventor is one Charles Gaume.

The Cost of Ink for the Public Service.—Mr. Stansfeld informed Mr. Crawford that the cost of ink annually purchased for the public service was 79,616 gallons of liquid ink, and 169,392 lb. of powder ink, and the cost was 3,212*l.* 6s. 6d., of which amount upwards of 1,500*l.* worth was purchased for and paid for by India. The whole amount was supplied by a private contract.

Contemplated New Church at Elmstead, near Colchester.—On Wednesday, the 8th, a meeting of the Building Committee appointed to carry out the contemplated erection of a new church at Elmstead Market, was held at the Bowling Green Inn, in that parish. The plans of Mr. James Stannard, of Leicester, were submitted for inspection, and accepted, the estimated cost of the church being something over 2,000*l.*

TENDERS.

For the erection of nursery, &c., at St. Marylebone Schools, Southall. Mr. H. Saxon Snell, architect. Quantities supplied:—

Nightingale	£1,363 0 0
Bamford & Son	1,320 0 0
Manley & Rogers	1,320 0 0
Hansom	1,319 0 0
Gibson, Bros.	1,274 0 0
Crabb & Vaughan	1,213 0 0
Howard (accepted)	1,189 0 0

For the erection of a house at Putney, for Mr. John Vaughan. Mr. Charles H. Goode, architect:—

Adamson & Sons (accepted)	£1,565 0 0

For a house and office at Tulse Hill, for Messrs. Rickett, Smith, & Co. Mr. Gill, Croydon, architect. Quantities not supplied:—

Garrett	£737 0 0
Bysh	679 0 0
Cressel (accepted)	658 0 0

For the erection of a farmhouse and homestead at Kensal Green, for Mr. Hinckman. Mr. Robert Hutchinson, architect:—

Nutt & Co.	£3,050 0 0
Bunting & Saint	2,994 0 0
Meville	2,928 0 0
Wicks	2,850 0 0
Dowel	2,745 0 0
Harrison & Sons	2,710 0 0
Blease	2,693 0 0
J. & R. Whittaker	2,635 10 0
Wills	2,550 0 0
Thackray	2,500 0 0
Dover & Co.	2,499 0 0
Parsons & Telling	2,499 0 0
Snowball	2,495 0 0
Wicks, Bangs, & Co.	2,493 0 0
Salter	2,375 0 0
Thompson & Smith	2,277 0 0
Bowler & Baxter	2,139 0 0

For the erection of a farmhouse and outbuildings at The Hyde, Kingsbury, for Mr. Aitkins. Mr. Robert Hutchinson, architect:—

Blease	£1,700 0 0
Wicks, Bangs, & Co.	1,680 0 0
Wills	1,599 0 0
Wicks	1,548 0 0
Nutt & Co.	1,500 0 0
Dowel	1,490 0 0
Harrison & Sons	1,478 0 0
Meville	1,470 0 0
Salter	1,450 0 0
Doune	1,398 10 0
Thackray	1,395 0 0
Dover & Co.	1,393 5 0
Willett	1,392 0 0
Thompson & Smith	1,327 0 0
Snowball	1,292 0 0
Parsons & Telling	1,249 0 0
Bowler & Baxter	1,185 10 0

For house at Sevenoaks, for Mr. A. Wilson. Mr. J. M. Hooker, architect. Quantities supplied:—

Anscomb (accepted)	£2,448 0 0

For proposed Union-house at Winchfield, Hurst, Hants. Mr. Edmund Woodthorp, architect. Quantities supplied by Messrs. Welch & Atkinson:—

Brass	£11,414 0 0
Hibbard	11,380 0 0
Nightingale	11,111 0 0
Birch	10,996 0 0
Henshaw	10,985 0 0
Perry, Bros.	10,980 0 0
Hill & Sons	10,980 0 0
Smith	10,600 14 0
Wood	10,000 0 0
Martin, Wells, & Co.	9,876 0 0
Sanders, W.	9,799 0 0
Sanders, F.	9,6?9 0 0
Bull & Sons (accepted)	9,497 0 0

For offices for the Clerk of the Peace for Kent, at Maidstone. Mr. Martin Bulmer, architect. Quantities by Mr. Geo. Ruck:—

Schofield	£1,540 6 3
Smith	1,281 14 0
Naylar	1,?87 0 0
Anscomb	1,045 0 0
Vaughan	1,022 0 0
Avard & Abnett	1,015 0 0
Bridge	993 0 0
Sollett	990 0 0
Wallis & Clements (accepted)	980 0 0

For schools at Belle Isle, Camden-road. Mr. E. M. Whitaker, architect. Quantities supplied by Mr. L. C. Riddett:—

Roberts	£1,494 0 0
Williams	1,465 0 0
Higgs	1,462 0 0
Bridgman & Nuthall	1,450 0 0
Scrivener & White	1,335 0 0

For additions to infirmary, at the workhouse, Bethnal-green, for the Guardians of Bethnal-green. Mr. Wm. Mundy, architect:—

Brown & Sons (accepted)	£653 8 0

For repairs to thirty-seven houses, in Jefferson-street, Bromley-by-Bow, for the British Empire Life Assurance Company. Mr. McDougall, architect:—

Tarrant	£1,519 0 0
Sayer	1,508 0 0
Sharp	1,255 0 0
Pierpoint	1,089 0 0
Stoner	995 0 0
Morley	991 12 6

For surface (pipe) drainage, Teddington. Mr. Thoma Goodchild, architect. Quantities supplied:—

Agate	£909 7 4
Cole	526 2 0
Brown	519 3 0
Slanden	510 0 0
Pizzey	495 0 0
Voss	457 10 10
Blackmore	445 0 0
Keeble	419 0 0
Young	401 10 0
Goodair	390 10 0
Bloomfield (accepted)	388 0 0

For house, Lansdown-road, Tottenham. Mr. T. E. Munday, architect:—

Clayton	£865 0 0
Chapman	770 0 0
Linzell	719 0 0
Hamlin	684 0 0
Shier	685 0 0
Webb	675 0 0
Nightingale	672 0 0
Mayers	666 0 0
Humphreys & Son	650 0 0
Garrud	649 0 0
Wicks, Bangs, & Co.	637 0 0
Harrison & Edwards	620 0 0
Bowler & Baxter	590 10 0
Rest & Brown	577 0 0
Neblett & Son	550 0 0
Whittaker	549 10 0
Hoare & Cleland (late)	535 0 0

For chapel at March, Cambridge. Mr. John Usher, architect:—

Cauven	£3,839 0 0
Nightingale	2,620 0 0
Broadhurst	2,471 10 0
Hutchinson	2,225 0 0

For Cambridge Corn Exchange. Mr. W. J. Bowyer, architect:—

Bardell & Son	£6,300 0 0
Feist & Waters	5,868 0 0
Thorday	5,200 0 0
Hailey	5,073 0 0
Nightingale	4,729 0 0
Bell & Sons	4,415 0 0
Loveday	4,375 0 0
Elworthy	4,325 0 0

For residence and stables, at Bendicote, near Banbury, Oxfordshire. Mr. Thos. M. Lockwood, architect:—

Dover & Co.	£5,781 0 0
Nightingale	5,678 0 0
Franklin & Sons	5,255 0 0
Munday	5,194 0 0
Claridge	4,830 0 0
Davis	4,572 0 0
Kimberley	4,498 0 0
F. & S. Orchard (accepted)	4,399 0 0
Palmer	3,973 0 0

For works, Grand Junction-street, Blackfriars. Mr. A. Peebles, architect:—

Hill & Sons	£2,576 0 0
Myers & Sons	2,415 0 0
Barnett	2,240 0 0
Adamson & Sons	2,226 0 0
Ramsey	2,215 0 0
Fish	2,190 0 0
Manley & Rogers	2,158 0 0
Sawyer	2,100 0 0
Nightingale	2,083 0 0
Patman & Fotheringham	1,988 0 0
Foster	1,942 0 0
Ennor	1,896 0 0

For rebuilding house and shop, No. 29, High-street, Hampstead, for Mr. Barnes. Mrs. P. C. Dyer, architect:—

Hill & Sons	£1,424 0 0
Scrivener & White	1,298 0 0
Manley & Rogers	1,277 0 0

For alterations and additions to Bromley Workhouse, at Locksbottom, Bromley, Kent, for the Guardians of Bromley Union. Mr. W. Lee, architect. Quantities supplied by Messrs. Linsdell & Giffard:—

Marsden	£5,600 0 0
Emmett	5,469 0 0
Garrett	4,843 0 0
Paine & Co.	4,838 0 0
Crabb & Vaughan	4,800 0 0
Armand	4,096 0 0
Gill	4,729 0 0
Henshaw	4,583 0 0
Hill, Keddell, & Waldram*	4,510 0 0
Tollett	4,477 0 0

* Accepted.

For St. Michael and All Angels' Mission Schools and residence, Woolwich. Mr. J. W. Walter, architect. Quantities supplied by Mr. W. F. Neighbour:—

Myers	£2,762 0 0
Woodford	2,513 10 8
Dove, Bros.	2,475 0 0
Manley & Rogers	2,465 0 0
Winship	2,230 0 0
Shepherd	2,150 0 0

For stabling, coach-house, &c., at St. Alban's, Herts, for Mr. Thos. Paget. Messrs. Henry Jarvis & Son architects:—

Tarrant	£1,681 0 0
Miskin	1,487 0 0
Thompson	1,480 0 0
Henshaw	1,447 0 0
Shepherd	1,445 0 0
Gammon & Son	1,385 0 0
Richardson	1,159 0 0